
**Apprenticeship
In-school Curriculum Standards**

**Sprinkler and Fire
Protection Installer**

427A

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Protection Installer**

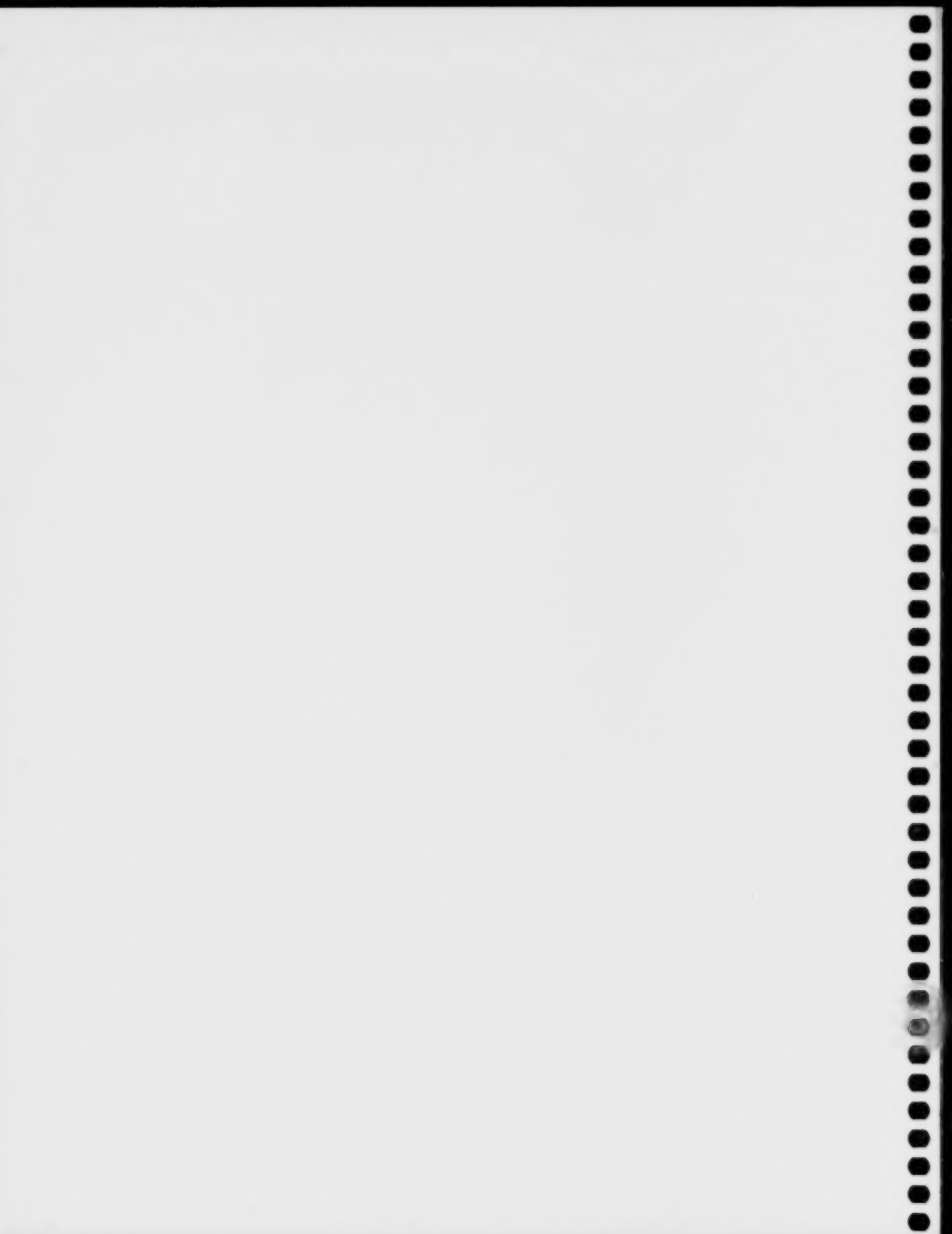
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Introduction

This new curriculum standard for the Sprinkler & Fire Protection Installer trade is designed from the learning outcomes which were developed from the industry-approved training standard.

The curriculum is organized into three levels of training, each including reportable subjects containing like or similar learning outcomes to reflect the performance objectives of the training standard. The program summary charts indicate how the curriculum can be delivered within the current block release format and summarize the hours of training for each reportable subject by level. Since the reportable subjects are all divisible by three, they can be adapted to accommodate flexible training delivery models other than block release.

The reportable subjects are cross-referenced to the training standard for ease of comparison.

Each reportable subject and learning outcome identifies a recommended number of training hours. This hour allotment is broken into hours for instruction in theory and practical application. The division of the curriculum into reportable subjects follows a natural progression of learning within each level and allows training providers flexibility in program delivery while still observing the importance to sequence learning in a logical progression.

The curriculum is framed by and includes specific references to terminal performance objectives in the Apprenticeship Training Standards for the Sprinkler and Fire Protection Installer trade. However, it identifies only the learning that takes place off the job in a training centre. This in-school program focuses primarily on the theoretical knowledge required to master the performance objectives of the Training Standards.

Employers are expected to extend the apprentice's knowledge and skills through appropriate practical training on the work site.

Regular evaluations of the apprentice's knowledge and skills is conducted throughout training to ensure that all apprentices have achieved the learning outcomes identified in the curriculum standard.

Implementation date:
October 2007

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Program Summary of Reportable Subjects – Level 1

Number	Reportable Subjects	Hours Total	Hours Theory	Hours Practical
S0421	Protect Self and Others	30	28.5	1.5
S0422	Tools and Equipment	9	4	5
S0423	Fabrication of Pipe and Fittings	81	53	28
S0424	Fire Protection Systems & Devices	120	120	0
	Total Hours	240	205.5	34.5

Program Summary of Reportable Subjects – Level 2

Number	Reportable Subjects	Hours Total	Hours Theory	Hours Practical
S0425	Rigging, Framing and Hoisting	12	9	3
S0426	Installation of Water Supply	75	75	0
S0427	Standpipe Fire Protection System	24	24	0
S0428	Specific Application Sprinkler Heads	30	30	0
S0429	Inspection, Testing and Maintenance of Fire Protection Systems	63	35.5	27.5
S0430	Installation of Piping Offsets	36	36	0
	Total Hours	240	209.5	30.5

Program Summary of Reportable Subjects – Level 3

Number	Reportable Subjects	Hours Total	Hours Theory	Hours Practical
S0431	Design Systems	48	36	12
S0432	Installation of Pumps, Drivers and Controllers	72	72	0
S0433	Detection and Actuation Devices	48	33	15
S0434	Specific Application Fire Protection Systems	42	42	0
S0435	Communication and Documentation	30	15	15
	Total Hours	240	198	42

Level 1

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Reportable Subjects – Level 1

Number	Reportable Subjects	Hours Total	Hours Theory	Hours Practical
S0421	Protect Self and Others	30	28.5	1.5
S0422	Tools and Equipment	9	4	5
S0423	Fabrication of Pipe and Fittings	81	53	28
S0424	Fire Protection Systems & Devices	120	120	0
	Total Hours	240	205.5	34.5

SPRINKLER & FIRE PROTECTION INSTALLER

Level 1 - Reportable Subject S0421

Title: **Protect Self and Others**

Duration: 30 Total Hours Theory: 28.5 Hours Practical: 1.5 Hours

Prerequisites: None

Co-requisites: None

Number	Topic	Hours Total	Hours Theory	Hours Practical
1	Codes, Acts and Regulations	6	6	0
2	Personal Protective Equipment	3	1.5	1.5
3	Housekeeping Duties	1.5	1.5	0
4	Fire Safety Procedures	1.5	1.5	0
5	Hazardous/Toxic Materials	6	6	0
6	Audio-Visual Alarms	1.5	1.5	0
7	Working Within Safe Physical Limits	1.5	1.5	0
8	Working Within Confined Space	3	3	0
9	Worksite Conditions	3	3	0
10	Lock Out and Tag Equipment	3	3	0
	Total Hours	30	28.5	1.5

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Level 1 - Reportable Subject S0421

Number: 1
Title: Codes, Acts and Regulations
Duration: 6 Total Hours Theory: 6 Hours Practical: 0 Hours

Cross-Reference to Training Standard: 5440.01

General Learning Outcome:

Upon successful completion of the reportable subject, the apprentice is able to demonstrate the use of safe working habits and procedures according to all applicable acts, codes, policies, procedures, and standards.

Learning Outcomes and Content:

Upon successful completion the apprentice is able to:

- 1.1 Identify applicable acts, codes and regulations.
 - *Occupational Health and Safety Act and Regulations (OHSA)*
 - *Trades Qualification and Apprenticeship Act (TQAA) and Regulations*
 - *Workplace Safety Insurance Act (WSIA)*
 - *Environmental Protection Act (EPA)*
 - *Boilers and Pressure Vessels Act (BPVA)*
 - *Dangerous Goods Transportation Act (DGTA)*
 - *Building Code Act (BCA)*
 - Workplace Hazardous Materials Information System (WHMIS)
 - Ontario Fire Code (OFC)
 - Building Codes
 - National Fire Prevention Association (NFPA)
- 1.2 Explain the difference between the "Act" and the "Regulations."
- 1.3 Identify the sections of OHSA that deal with the construction industry.
- 1.4 Interpret applicable acts, codes and regulations.
 - identify the group responsible for enforcement of the construction health and safety outlined in OHSA
 - state the responsibilities of the employer, worker and inspector
 - explain when a worker may refuse work
 - define a supervisor and a competent worker
 - explain when a safety supervisor and/or a safety committee must be established

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- 1.5 Identify and apply sections of applicable acts, codes and regulations related to:
- personal protective clothing
 - hand and power tools
 - fire safety procedures
 - hazardous/toxic materials
 - fire safety procedures
 - first aid treatment, including CPR
 - flammable substances
 - housekeeping practices
- 1.6 Explain common causes of most construction accidents.

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Level 1 - Reportable Subject S0421

Number: 2
Title: Personal Protective Equipment
Duration: 3 Total Hours Theory: 1.5 Hours Practical: 1.5 Hours

Cross-Reference to Training Standard: 5440.02

General Learning Outcome:

Upon successful completion of the reportable subject, the apprentice is able to demonstrate the ability to protect self and others through the use of appropriate work dress and personal protective equipment, according to all applicable acts, codes, policies, procedures and standards.

Learning Outcomes and Content:

Upon successful completion the apprentice is able to:

- 2.1 Identify and interpret sections of the *Ontario Occupational Health and Safety Act*, Construction Safety Association of Ontario, and company policies and procedures related to personal protection.
- 2.2 Describe the requirements for acceptable work dress and personal protective equipment including:
 - safety boots
 - hard hats
 - gloves
 - glasses, goggles
 - masks
 - coveralls
 - safety harness
 - respirators
 - ear protection
 - barrier creams
- 2.3 Select, adjust and maintain protective equipment that provides maximum protection suitable to the given task including:
 - work clothing
 - headwear
 - foot wear
 - eye wears

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Level 1 - Reportable Subject S0421

Number 3
Title: Housekeeping Duties
Duration: 1.5 Total Hours Theory: 1.5 Hours Practical: 0 Hours

Cross-Reference to Training Standard: 5440.03

General Learning Outcome:

Upon successful completion of the reportable subject, the apprentice is able to demonstrate the ability to maintain a clean and safe work area according to all applicable acts, codes, policies, procedures, and standards.

Learning Outcomes and Content:

Upon successful completion the apprentice is able to:

- 3.1 Identify and comply with all applicable codes, and company/customer standards.
- 3.2 Identify the location of first aid equipment and supplies.
- 3.3 Identify the location of fire extinguishers.
- 3.4 Identify job conditions that require heating, ventilation and lighting.
- 3.5 Explain the purpose of storing material and equipment in designated areas.
- 3.6 Erect protective barriers as required.
- 3.7 Remove debris to designated locations at intervals that will keep the work area clean and safe.
- 3.8 Recycle materials as required and where possible.

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Level 1 - Reportable Subject S0421

Number: 4
Title: Fire Safety Procedures
Duration: 1.5 Total Hours Theory: 1.5 Hours Practical: 0 Hours

Cross-Reference to Training Standard: 5440.07

General Learning Outcome:

Upon successful completion of the reportable subject, the apprentice is able to demonstrate the ability to follow and practice fire safety according to all applicable acts, codes, policies, procedures, and standards.

Learning Outcomes and Content:

Upon successful completion the apprentice is able to:

- 4.1 Practice fire prevention on the worksite.
 - clean up worksite and dispose of all debris
 - store materials away from overhead power lines
 - keep work and travel areas tidy, well lit, and ventilated
 - post signs to warn workers of hazardous areas
 - keep stairways, passageways and gangways free of obstructions
- 4.2 Identify where fire extinguishers must be provided.
- 4.3 Identify the location of fire alarms.
- 4.4 Determine the potential for fire posed by the work being performed.
- 4.5 Identify where fire hazardous areas are located.
- 4.6 Identify fire-extinguishing equipment for specific types of fire.
- 4.7 Describe procedures to locate and to assess the severity of a fire.
- 4.8 Describe the measures taken to suppress a minor fire.
- 4.9 Describe a fire evacuation plan according to the Ontario Fire Prevention Code and company policies and procedures.

Level 1 - Reportable Subject S0421

Number: 5
Title: Hazardous/Toxic Materials
Duration: 6 Total Hours Theory: 6 Hours Practical: 0 Hours

Cross-Reference to Training Standard: 5440.08

General Learning Outcome:

Upon successful completion of the reportable subject, the apprentice is able to identify the procedures for selecting, transporting and storing hazardous/toxic materials according to all applicable acts, codes, policies, procedures, and standards.

Learning Outcomes and Content:

Upon successful completion the apprentice is able to:

- 5.1 Identify procedures for handling flammable liquids.
 - state safe and approved methods for transporting
 - identify safe and approved storage containers
 - identify safe and approved storage locations
 - identify and select the required work dress and personal protective equipment
- 5.2 Identify procedures for handling oxygen and acetylene cylinders.
 - describe the correct secured positions during use, storage and transportation
 - Identify the type of fire extinguisher required when oxygen and acetylene are on a job site
 - identify and select the required work dress and personal protective equipment
- 5.3 Identify procedures for handling propane cylinders.
 - determine the safe and approved method for transporting
 - identify safe and approved storage containers
 - identify safe and approved storage locations
 - identify and select the required work dress and personal protective equipment
- 5.4 Identify procedures for handling various acids, solvents and cleaners.
 - determine the safe and approved method for transporting
 - identify and select the required type (s) of respirator apparatus for the hazard
 - identify and select the required work dress and personal protective equipment
- 5.5 Identify procedures for handling asbestos materials.
 - describe the hazards associated with asbestos materials
 - describe the safe and approved method for working in an area where asbestos is present
 - identify and select the required work dress and personal protective equipment

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Level 1 - Reportable Subject S0421

Number 6
Title: Audio-Visual Alarms
Duration: 1.5 Total Hours Theory: 1.5 Hours Practical: 0 Hours

Cross-Reference to Training Standard: 5440.06

General Learning Outcome:

Upon successful completion of the reportable subject, the apprentice will be able to demonstrate the ability to recognize and respond to audio-visual alarms according to all applicable acts, codes, policies, procedures, and standards.

Learning Outcomes and Content:

Upon successful completion the apprentice is able to:

- 6.1 Identify and explain the purpose of all audio-visual alarms including:
- warning signs
 - danger notices
 - alarm bells
 - whistles
 - buzzers
 - vibrators
 - lights

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Level 1 - Reportable Subject S0421

Number 7
Title: Working Within Safe Physical Limits
Duration: 1.5 Total Hours Theory: 1.5 Hours Practical: 0 Hours

Cross-Reference to Training Standard: 5440.04

General Learning Outcome:

Upon successful completion of the reportable subject, the apprentice will be able to demonstrate the ability to protect self and others by working within safe physical limits according to all applicable acts, codes, policies, procedures, and standards.

Learning Outcomes and Content:

Upon successful completion the apprentice is able to:

- 7.1 Identify and interpret applicable sections of the *Ontario Occupational Health and Safety Act*, company policies and procedures, and any applicable manufacturers' instructions and recommendations.
- 7.2 Determine safe physical limits using correct body mechanics when bending, lifting, transporting or climbing with heavy loads.
- 7.3 Determine which conditions would cause personal injury.

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Level 1 - Reportable Subject S0421

Number 8
Title: Working Within Confined Spaces
Duration: 3 Total Hours Theory: 3 Hours Practical: 0 Hours

Cross-Reference to Training Standard: 5440.10

General Learning Outcome:

Upon successful completion of the reportable subject, the apprentice is able to identify confined spaces and explain entry and exit procedures according to all applicable acts, codes, policies, procedures, and standards.

Learning Outcomes and Content:

Upon successful completion the apprentice is able to:

- 8.1 Identify confined space hazards.
 - physical
 - atmospheric
- 8.2 Describe the types of physical hazards that involve greater risk inside rather than outside a confined space.
- 8.3 Describe physical hazards that may cause injury or increase the severity of injury.
 - poor access
 - cramped working conditions
 - temperature extremes
 - rotating or moving equipment
 - reactive or corrosive residues
 - electrical hazards
 - movement of liquids or solids in pipes, vessels, etc.
- 8.4 Identify dangerous atmospheres that may be present in confined spaces.
 - explosive
 - oxygen enriched or oxygen deficient
 - toxic
- 8.5 Identify the explosive range of a flammable gas or vapor.

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- 8.6 Evaluate a physical hazard once it has been identified.
- inspect the confined space from outside
 - identify any equipment that could be activated by stored pressure, accidental contact or gravity action
 - discuss proposed action with client and /or plant personnel
 - check for exposed electrical conductors or energized apparatus
- 8.7 Explain procedures for testing and evaluating atmospheric dangerous hazards using special devices before each entry and during work period
- identify detection equipment
 - Explain application of the detection equipment
 - calibrate, maintain and use detection equipment
 - test for too much or too little oxygen and interpret results
 - test for combustible or explosive gas and vapors and interpret results
 - test for toxic gases or vapors and interpret results

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Level 1 - Reportable Subject S0421

Number 9
Title: Worksite Conditions
Duration: 3 Total Hours Theory: 3 Hours Practical: 0 Hours

Cross-Reference to Training Standard: 5440.09

General Learning Outcome:

Upon successful completion of the reportable subject, the apprentice is able to demonstrate the ability to identify the hazards of inappropriate behavior on the worksite and also assess worksite conditions according to all applicable acts, codes, policies, procedures, and standards.

Learning Outcomes and Content:

Upon successful completion the apprentice is able to:

- 9.1 Identify and assess worksite conditions.
 - adequate lighting and ventilation
 - confined space entry
 - presence of hazardous conditions
 - unsafe equipment and materials
- 9.2 State the procedures to follow when the following worksite conditions are encountered.
 - problems with equipment that may endanger the worker or other workers
 - any contravention of acts, codes, policies, procedures or standards
 - jobsite hazards
- 9.3 Identify the types of inappropriate behavior that could endanger yourself and/or co-workers on the worksite.
- 9.4 Identify the types of inappropriate behavior on the worksite that could cause damage to equipment.

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Level 1 - Reportable Subject S0421

Number 10
Title: Lock Out and Tag Equipment
Duration: 3 Total Hours Theory: 3 Hours Practical: 0 Hours

Cross-Reference to Training Standard: 5440.11

General Learning Outcome:

Upon successful completion of the reportable subject, the apprentice is able to explain lock out, tagging and de-energizing procedures to electrical, mechanical, hydraulic and pneumatic equipment according to all applicable acts, codes, policies, procedures, and standards.

Learning Outcomes and Content:

Upon successful completion the apprentice is able to:

- 10.1 Determine what conditions would cause mechanical and electrical equipment to be tagged and locked out.
- 10.2 Describe how to lock out electrical, mechanical, hydraulic and pneumatic equipment.
- 10.3 Describe tagging procedures of defective mechanical, electrical hydraulic and pneumatic equipment.
- 10.4 Describe how to remove locked out electrical, mechanical, hydraulic and pneumatic equipment.
- 10.5 Explain lockout and tagging procedures.

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Level 1 - Reportable Subject S0421 – Protect Self and Others

Evaluation Structure:

Theory Testing	30%
Practical Exercises	10%
Final Assessment	60%

Minimum Equipment List:

air hood
apron
boots
coveralls
ear plugs and ear muffs
face shield
fall arrest system
filtration mask
fire blanket
fire extinguisher
fire hoses
fire-retardant clothing
gloves
goggles
mask (particle, vapor)
reflector vest
respirator
safety glasses
safety helmet
self-contained breathing apparatus
tag and lock-out devices
travel restraint system
welding partition

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Level 1 - Reportable Subject S0422

Title: Tools and Equipment

Duration: 9 Total Hours Theory: 4 Hours Practical: 5 Hours

Prerequisites: Reportable Subject S0421

Co-requisites: None

Number	Topic	Hours Total	Hours Theory	Hours Practical
1	Hand Tools	3	1	2
2	Power and Hydraulic Tools and Accessories	3	0	3
3	Ladders	1.5	1.5	0
4	Scaffolding Equipment	1.5	1.5	0
	Total Hours	9	4	5

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Level 1 - Reportable Subject S0422

Number 1
Title: Hand Tools
Duration: 3 Total Hours Theory: 1 Hour Practical: 2 Hours

Cross-Reference to Training Standard: 5445.01

General Learning Outcome:

Upon successful completion of the reportable subject, the apprentice is able to identify, select, use and maintain hand tools according to all applicable acts, codes, policies, procedures, and standards.

Learning Outcomes and Content:

Upon successful completion the apprentice is able to:

- 1.1 Identify, demonstrate the use of use and maintain various hand tools including: layout and measuring devices
 - screwdrivers
 - pliers
 - nut drivers
 - wrenches
 - vises and clamps
 - hammers
 - saws
 - files
 - drills
 - punches
 - chisels
 - cutters
 - reamers
 - threaders
 - rope
- 1.2 Identify types of hand tools according to job specifications.
 - size and design including number and symbol classification
 - application to specific materials
 - capacity
 - operation

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- 1.3 Identify the methods of assembly and adjustments for various hand tools.
- 1.4 Describe knots and hitches used on ropes, their applications and safety factors.
- 1.5 Demonstrate the ability to tie approved knots, bends and hitches.

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Level 1 - Reportable Subject S0422

Number: 2
Title: Power and Hydraulic Tools and Accessories
Duration: 3 Total Hours Theory: 0 Hours Practical: 3 Hours

Cross-Reference to Training Standard: 5445.02

General Learning Outcome:

Upon successful completion of the reportable subject, the apprentice is able to identify, select, use and maintain various power and hydraulic tools according to all applicable acts, codes, policies, procedures, and standards.

Learning Outcomes and Content:

Upon successful completion the apprentice is able to:

- 2.1 Identify and demonstrate the use of various power and hydraulic tools based on the specified types, applications, tolerance and job materials.
 - drills
 - pipe cutters
 - grooving machines
 - saws
 - threading machines
 - hydraulic press
 - grinders
 - drill press
 - chop saws
 - gas powered saws
- 2.2 Identify and select power and hydraulic tool accessories based on the specified types, applications, tolerance, and job materials.
- 2.3 Identify power and hydraulic tool accessories by model number and/or symbol.
- 2.4 Identify the power requirements of the tools by checking the voltage, amperage and grounding requirements.
- 2.5 Identify common hazards related to the use of power and hydraulic tools and accessories.
- 2.6 Describe safe operation, adjustment, maintenance and storage of power and hydraulic tools and accessories.

Level 1 - Reportable Subject S0422

Number 3
Title: Ladders
Duration: 1.5 Total Hours Theory: 1.5 Hours Practical: 0 Hours

Cross-Reference to Training Standard: 5445.03

General Learning Outcome:

Upon successful completion of the reportable subject, the apprentice is able to identify, select, use and maintain various ladders according to all applicable acts, codes, policies, procedures, and standards.

Learning Outcomes and Content:

Upon successful completion the apprentice is able to:

- 3.1 Identify and use ladders including:
 - wooden
 - aluminum
 - fiberglass
 - step
 - trestle
 - extension
- 3.2 Describe the safety hazards when using a ladder in the following situations.
 - ladders not held, tied off or otherwise secured
 - slippery surfaces and unfavorable weather conditions
 - weak grip when ascending or descending
 - leaning or reaching too far
 - placement on poor footing or at improper angles
 - high wind conditions
 - electrical lines present
- 3.3 Describe hazards specific to wooden, aluminum and fiberglass ladders.
- 3.4 Identify defective ladders and explain why they should be taken out of service and tagged for repair or scrapped.

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Level 1 - Reportable Subject S0422

Number: 4
Title: Scaffolding Equipment
Duration: 1.5 Total Hours Theory: 1.5 Hours Practical: 0 Hours

Cross-Reference to Training Standard: 5445.04

General Learning Outcome:

Upon successful completion of the reportable subject, the apprentice is able to describe the procedures for selecting, erecting, dismantling and maintaining scaffolding according to all applicable acts, codes, policies, procedures, and standards.

Learning Outcomes and Content:

Upon successful completion the apprentice is able to:

- 4.1 Describe precautions for erecting stationary and rolling scaffolding.
 - worker access
 - planked/decked platforms
 - platform guardrails
 - base plates, connections, and braces
 - mooring
 - moving
- 4.2 Determine the required scaffolding system for the job.
 - weight of workers, tools, materials, and equipment
 - job application
 - height required
 - duration of work
 - pedestrian traffic
 - special erection or dismantling problems
- 4.3 Describe the procedures for inspecting scaffolding and components before and after erection.
 - frames, base plates, braces and other structural components
 - hooks on manufactured platforms
 - splits, knots and dry rot in planks
 - de-lamination of laminated veneer planks
 - compatibility of components
 - enough components for job
 - surface supports
 - shoring and mooring components

- 4.4 Describe how to install and dismantle all parts and accessories of scaffolding based on job application and site conditions.
- ground/surface conditions
 - variations in surface elevation
 - support requirements
 - weather conditions
 - obstructions
 - overhead wires
 - building configuration
 - tie-in locations and methods

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Level 1 - Reportable Subject S0422 – Tools and Equipment

Evaluation Structure

Theory Testing	0 %
Practical Exercises	50 %
Final Assessment	50 %

Minimum Equipment List:

brushes	punches
compressor	reamer
chisels	rod dies
choker	rope
cutters	saws
die and chasers	scrapers
die equipment	screwdrivers
drills	shovel
electrical meters	sling
files	snips
grease gun	socket sets
grinder and attachments	soldering iron
groovers	stand chain block hoist
hammers	straight edge
heaters	tamper
hydraulic bender	tapping machine and attachments
ladders	testing pump
line-up bars	threading machine
measuring devices	utility knives
mechanical pipe-joining equipment	vices and clamps
nipple chuck	vacuum (wet/dry)
nut drivers	water hose
oil can	water pump
paint brushes	welding, cutting, brazing equipment
pick	wrenches
pigtail	
pipe cutter	
pipe stand	
pliers	
plum bob	
power spray-pointing equipment	
power vise	
pry bar	

SPRINKLER & FIRE PROTECTION INSTALLER

Level 1 - Reportable Subject S0423

Title: Fabrication of Pipe and Fittings

Duration: 81 Total Hours Theory: 53 Hours Practical: 28 Hours

Prerequisites: Reportable Subjects S0421 and S0422

Co-requisites: None

Number	Topic	Hours Total	Hours Theory	Hours Practical
1	Site Fabrication Area	3	2	1
2	Steel and Plastic Pipe and Fittings	24	24	0
3	Copper Pipe	6	3	3
4	Piping Installation	36	12	24
5	Hangers, Brackets and Hanger Supports	12	12	0
	Total Hours	81	53	28

SPRINKLER & FIRE PROTECTION INSTALLER

Level 1 - Reportable Subject S0423

Number: 1
Title: Site Fabrication Area
Duration: 3 Total Hours Theory: 2 Hours Practical: 1 Hour

Cross-Reference to Training Standard: 5447.01

General Learning Outcome:

Upon successful completion of the reportable subject, the apprentice is able to establish a site fabrication area by referencing the site plan and coordinating site activities with other trades according to all applicable acts, codes, policies, procedures, and standards.

Learning Outcomes and Content:

Upon successful completion the apprentice is able to:

- 1.1 Describe site meetings and explain their purpose.
- 1.2 Identify and establish a suitable fabrication area.
 - accessibility
 - lighting
 - traffic flow
 - material, equipment handling, and storage
 - power supply

SPRINKLER & FIRE PROTECTION INSTALLER

Level 1 - Reportable Subject S0423

Number: 2
Title: Steel and Plastic Pipe and Fittings
Duration: 24 Total Hours Theory: 24 Hours Practical: 0 Hours

Cross-Reference to Training Standard: 5446.05, 5448.02

General Learning Outcome:

Upon successful completion of the reportable subject, the apprentice is able to prepare steel and plastic pipe and fittings to be fabricated using shop drawings, and take off or cut sheets, so that fabrication process is organized according to all applicable acts, codes, policies, procedures, and standards.

Learning Outcomes and Content:

Upon successful completion the apprentice is able to:

- 2.1 Read and interpret basic shop drawings, take off or cut sheets.
- 2.2 Draw and label basic views of an object.
 - plain
 - isometric
- 2.3 Identify piping components and describe their purpose and relationships.
 - system riser
 - riser
 - feed mains
 - cross mains
 - branch lines
 - header
- 2.4 Describe criteria for selection of steel pipe and fittings.
 - schedule numbers and grades
 - pressure ratings
 - pipe types, sizes and lengths
 - end finishes
 - protective coatings and linings
- 2.5 Describe the equipment and techniques used to thread pipe.
 - hand tools
 - powered threaders
 - nipple chucks
 - thread cutting lubricants
 - thread standards

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- 2.6 Identify the types of threaded pipe fittings and describe their characteristics and applications.
- malleable
 - cast iron
 - steel
 - galvanized
 - non-ferrous
 - stainless
- 2.7 Describe the procedures used to join threaded pipe and install fittings.
- brazing
 - welding
- 2.8 Identify types and describe the selection criteria of flanges and their associated fittings and gaskets.
- 2.9 Identify the selection criteria for types of grooved and grip-style pipe fittings and gaskets and explain the procedures used to join them to pipe.
- markings
 - materials and types
 - color coding of gaskets
 - pressure and temperature ratings
- 2.10 Identify the selection criteria for plastic pipe and describe the types of fittings and solvents used in joining applications.
- types
 - sizes
 - pressure and temperature ratings
- 2.11 Describe the procedures used to join plastic pipe using the solvent welding process.
- safety requirements
 - fabrication process and materials
 - drilling and cleaning
 - assembly
 - tools
 - ventilation
 - cure times
 - testing

Level 1 - Reportable Subject S0423

Number 3
Title: Copper Pipe
Duration: 6 Total Hours Theory: 3 Hours Practical: 3 Hours

Cross-Reference to Training Standard: 5446.05

General Learning Outcome:

Upon successful completion of the reportable subject, the apprentice is able to prepare and assemble copper pipe for fabrication using shop drawings, and take off or cut sheets, according to all applicable acts, codes, policies, procedures, and standards.

Learning Outcomes and Content:

Upon successful completion the apprentice is able to:

- 3.1 Describe criteria for selection of copper pipe.
 - types
 - schedule numbers and grades
 - pressure ratings
 - sizes and lengths
 - end finishes
 - codes
 - manufacturers' specifications
 - manufacturing techniques
- 3.2 Describe the tools, equipment and techniques used to join copper pipe.
 - brazing
 - soldering
 - compression
 - flaring
- 3.3 Describe selection criteria for solders and brazing alloys.
 - types
 - pressure rating
 - temperature rating
 - application
- 3.4 Identify and apply types of flux used in soldering or brazing and describe their purpose, applications and effects.

- 3.5 Apply procedures used to solder or braze joints.
- types of torches, both fuel and electric
 - torch and tip selection
 - code interpretation and application

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Level 1 - Reportable Subject S0423

Number	4		
Title:	Piping Installation		
Duration:	36 Total Hours	Theory: 12 Hours	Practical: 24 Hours

Cross-Reference to Training Standard: 5447.03

General Learning Outcome:

Upon successful completion of the reportable subject, the apprentice is able to prepare and install piping from approved drawings and fabrication sheets according to all applicable acts, codes, policies, procedures, and standards.

Learning Outcomes and Content:

Upon successful completion the apprentice is able to:

- 4.1 Prepare and install fabricated piping from approved shop drawings.
 - measure
 - cut
 - thread
 - groove
 - weld
 - solder
 - braze
- 4.2 Demonstrate use of tools and equipment to complete fabrication.
 - tapes
 - cutters
 - threaders
 - groovers
 - drills
 - welding equipment
- 4.3 Prepare material listing sheet for a 90° piping project.
- 4.4 Prepare material listing sheet and fabricate a 45° piping installation project.

SPRINKLER & FIRE PROTECTION INSTALLER

Level 1 - Reportable Subject S0423

Number 5
Title: Hangers, Brackets, and Hanger Supports
Duration: 12 Total Hours Theory: 12 Hours Practical: 0 Hours

Cross-Reference to Training Standard: 5447.04, 5448.04

General Learning Outcome:

Upon successful completion of the reportable subject, the apprentice is able to select brackets and hanger supports so that pipe installations are completed according to all applicable acts, codes, policies, procedures, and standards.

Learning Outcomes and Content:

Upon successful completion the apprentice is able to:

- 5.1 Identify types of hangers used in the installation of pipe and describe their characteristics and applications.
- 5.2 Identify sway bracing and describe its applications.
- 5.3 Identify types of protective materials applied to hangers and describe their purpose and applications.
- 5.4 Identify hanger requirements for various piping systems.
- 5.5 Describe procedures used to install fasteners and inserts.
- 5.6 Identify types and sizes of hanger rod and describe their applications.
- 5.7 Identify tools and procedures used for installation of hangers and supports.
- 5.8 Describe installation requirements for hangers, supports and bracing including:
 - angle irons
 - pipe trapeze bars
 - rings, rods, fastening devices
- 5.9 Identify seismic bracing and sleeving requirements.
- 5.10 Identify hanger requirements for installation of residential systems.

Level 1 - Reportable Subject S0423 – Fabrication of Pipe and Fittings

Evaluation Structure:

Theory Testing	45 %
Practical Exercises	30 %
Final Assessment	25 %

Minimum Equipment List:

adapter fittings	pipe stand
bench vice	pliers
calibrating gauge	plum bob
calculator	power spray-pointing equipment
calipers	press fit
computer brushes	power vise
chisels	pry bar
choker	punches
compressor	reamer
cutters	rod dies
depth gauge	rope
die and chasers	saws
die equipment	scrapers
drafting equipment	screwdrivers
drills	shovel
electrical meters	sling
feeler gauge	snips
files	socket sets
flaring tool	soldering iron
grease gun	square
grinder and attachments	straight edge
groovers	stand chain block hoist
hammers	T-drill
heaters	tamper
hoses	tape measure
hydraulic bender	tapping machine and attachments
ladders	test blanks
laser, magnetic and spirit levels	testing pump
line-up bars	thread depth gauge
measuring devices	threading machine
mechanical pipe-joining equipment	torgue wrench
nipple chuck	utility knives
nut drivers	vices and clamps
oil can	vacuum (wet/dry)
paint brushes	water hose
pick	water pump

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pigtail
pipe cutter

welding, cutting, brazing equipment
wrenches

SPRINKLER & FIRE PROTECTION INSTALLER

Level 1 - Reportable Subject S0424

Title: Fire Protection Systems and Devices

Duration: 120 Total Hours **Theory:** 120 Hours **Practical:** 0 Hours

Prerequisites: None

Co-requisites: None

Number	Topic	Hours Total	Hours Theory	Hours Practical
1	Check, Control and Drain Valves	18	18	0
2	Standard Spray Sprinkler Heads	24	24	0
3	Wet Pipe Fire Protection System	18	18	0
4	Anti-Freeze Fire Protection System	9	9	0
5	Dry Pipe Fire Protection System	24	24	0
6	Pre-Action and Deluge Fire Protection System	18	18	0
7	Combined Dry Pipe and Pre-Action Fire Protection System	9	9	0
	Total Hours	120	120	0

SPRINKLER & FIRE PROTECTION INSTALLER

Level 1 - Reportable Subject S0424

Number 1
Title: Check, Control and Drain Valves
Duration: 18 Total Hours Theory: 18 Hours Practical: 0 Hours

Cross-Reference to Training Standard: 5448.02, 5448.03, 5448.05

General Learning Outcome:

Upon successful completion of the reportable subject, the apprentice is able to select and identify check, control and drain valves according to all applicable acts, codes, policies, procedures, and standards.

Learning Outcomes and Content:

Upon successful completion the apprentice is able to:

- 1.1 Identify types of valves and describe their operation and applications.
 - ball
 - butterfly
 - check
 - gate
 - globe
 - alarm
 - dry
 - pressure reducing
 - pressure relief
 - test and drain
 - indicating/non-indicating drain
 - water post indicators
 - quick opening devices
 - pre-action and deluge
- 1.2 Describe major design variations and construction features of valves.
- 1.3 Identify indicating valves and explain their operation.

- 1.4 Describe the procedures for installation and maintenance of valves.
- ball
 - butterfly
 - check
 - gate
 - globe
 - alarm
 - dry
 - pressure reducing
 - pressure relief
 - test and drain
 - wall post indicators
 - quick opening devices
 - pre-action and deluge

SPRINKLER & FIRE PROTECTION INSTALLER

Level 1 - Reportable Subject S0424

Number: 2
Title: Standard Spray Sprinkler Heads
Duration: 24 Total Hours Theory: 24 Hours Practical: 0 Hours

Cross-Reference to Training Standard: 5443.01, 5443.02, 5443.03, 5444.04, 5451.01, 5449.05, 5449.06, 5449.07, 5449.08, 5449.09, 5449.10

General Learning Outcome:

Upon successful completion of the reportable subject, the apprentice is able to identify and select a range of commonly used standard spray sprinkler heads according to all applicable acts, codes, policies, procedures, and standards.

Learning Outcomes and Content:

Upon successful completion the apprentice is able to:

- 2.1 Identify the various categories and listing information on standard spray sprinkler heads.
 - solder
 - bulb
 - open
- 2.2 Identify temperature ratings and color coding.
 - fusible link
 - glass bulb
 - decorative
- 2.3 Identify the performance characteristics that apply to standard spray sprinkler heads.
 - deflector design/spray patterns
 - orifice sizes
 - temperature rating
 - temperature sensitivity
 - orientation
- 2.4 Identify standard spray sprinkler head symbols used on blueprints, spools and other piping drawings.

SPRINKLER & FIRE PROTECTION INSTALLER

- 2.5 Describe methods for protection of standard spray sprinkler heads.
 - shipping
 - unpacking
 - storage
 - installation
- 2.6 Identify factors that affect maximum ceiling temperature.
- 2.7 Explain the procedures for installing standard spray sprinkler heads.
- 2.8 Explain the location requirements of standard spray sprinkler heads in relation to:
 - bays
 - beams
 - girders
 - joists
 - open bar joists
 - open ceilings
 - trusses
 - storage materials
- 2.9 Identify required distances between sprinkler heads for specific hazards.
 - light hazard
 - ordinary hazard
 - extra hazard

SPRINKLER & FIRE PROTECTION INSTALLER

Level 1 - Reportable Subject S0424

Number 3
Title: Wet-Pipe Fire Protection System
Duration: 18 Total Hours Theory: 18 Hours Practical: 0 Hours

Cross-Reference to Training Standard: 5449.05

General Learning Outcome:

Upon successful completion of the reportable subject, the apprentice is able to determine the requirements for the installation of wet-pipe fire protection system according to all applicable acts, codes, policies, procedures, and standards.

Learning Outcomes and Content:

Upon successful completion the apprentice is able to:

- 3.1 Identify wet-pipe sprinkler system and describe its operating principles and characteristics for commercial, industrial and residential structures.
- 3.2 Describe the advantages of a wet-pipe sprinkler system.
- 3.3 Explain the procedures for installing and removing components of wet-pipe sprinkler system.
- 3.4 Describe methods for preventing false alarms on a wet-pipe sprinkler system.

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Level 1 - Reportable Subject S0424

Number: 4
Title: Anti-Freeze Fire Protection Systems
Duration: 9 Total Hours Theory: 9 Hours Practical: 0 Hours

Cross-Reference to Training Standard: 5449.06

General Learning Outcome:

Upon successful completion of the reportable subject, the apprentice is able to determine the requirements for the installation of an anti-freeze fire protection system according to all applicable acts, codes, policies, procedures, and standards.

Learning Outcomes and Content:

Upon successful completion the apprentice is able to:

- 4.1 Describe the characteristics of anti-freeze fire protection system.
- 4.2 Explain freezing protection of sprinkler controls and systems.
- 4.3 Describe how sprinkler systems using anti-freeze solutions operate.
- 4.4 Describe the procedures to follow for compliance with state and local regulations concerning the use of anti-freeze solutions in a sprinkler system.
 - types of solutions
 - potable water supply
 - non-potable water supply
 - cross-connections
- 4.5 Describe how to determine and prepare appropriate anti-freeze solutions for varying freezing temperatures.
- 4.6 Describe the procedures for installing an anti-freeze sprinkler system.
 - total capacity
 - anti-freeze loop
 - cross connection control
- 4.7 Explain how to fill systems that employ anti-freeze solutions.

SPRINKLER & FIRE PROTECTION INSTALLER

Level 1 - Reportable Subject S0424

Number 5
Title: Dry Pipe Fire Protection System
Duration: 24 Total Hours Theory: 24 Hours Practical: 0 Hours

Cross-Reference to Training Standard: 5449.07

General Learning Outcome:

Upon successful completion of the reportable subject, the apprentice is able to determine the requirements for the installation of dry-pipe fire protection system according to all applicable acts, codes, policies, procedures, and standards.

Learning Outcomes and Content:

Upon successful completion the apprentice is able to:

- 5.1 Identify dry-pipe sprinkler system and describe its operating principles and characteristics.
- 5.2 Describe the special requirements for arranging, installing, maintaining and inspecting dry-pipe systems that protect unheated areas.
- 5.3 Identify components of dry pipe sprinkler systems and describe their location, purpose and operation.
- 5.4 Describe methods for preventing false alarms on a dry-pipe sprinkler system.

Level 1 - Reportable Subject S0424

Number: 6
Title: Pre-Action and Deluge Fire Protection Systems
Duration: 18 Total Hours Theory: 18 Hours Practical: 0 Hours

Cross-Reference to Training Standard: 5449.09

General Learning Outcome:

Upon successful completion of the reportable subject, the apprentice is able to determine the requirements for the installation of pre-action and deluge systems according to all applicable acts, codes, policies, procedures, and standards.

Learning Outcomes and Content:

Upon successful completion the apprentice is able to:

- 6.1 Identify the components pre-action and deluge systems and their applications.
- 6.2 Identify the activation methods for pre-action and deluge system detection lines.
 - pneumatic
 - hydraulic
 - electric
- 6.3 Describe the procedures for installing pre-action and deluge systems.
 - single interlock
 - double interlock
 - non-interlocking
- 6.4 Explain the requirements for drainage of pre-action and deluge systems.

SPRINKLER & FIRE PROTECTION INSTALLER

Level 1 - Reportable Subject S0424

Number 7
Title: Combined Dry-Pipe and Pre-action Fire Protection Systems
Duration: 9 Total Hours Theory: 9 Hours Practical: 0 Hours

Cross-Reference to Training Standard: 5449.08

General Learning Outcome:

Upon successful completion of the reportable subject, the apprentice is able to determine the installation requirements for combination dry-pipe and pre-action systems according to all applicable acts, codes, policies, procedures, and standards.

Learning Outcomes and Content:

Upon successful completion the apprentice is able to:

- 7.1 Describe the circumstances that require combined dry-pipe and pre-action systems.
- 7.2 Describe the distinguishing characteristics of a combined dry-pipe and pre-action sprinkler system.
- 7.3 Explain the function of dry-pipe and air exhaust valves in combined systems.
- 7.4 Describe the requirements for dividing combined systems using check valves.

SPRINKLER & FIRE PROTECTION INSTALLER

Level 1 - Reportable Subject S0424 – Fire Protection Systems & Devices

Evaluation Structure:

Theory Testing	75 %
Practical Exercises	0 %
Final Assessment	25 %

Minimum Equipment List:

adapter fittings
backflow devices
ball, butterfly, check, gate, and globe valves
bench vice
calculator
calibrating gauge
calipers
computer
depth gauge
drafting equipment
feeler gauge
flaring tool
hoses
hydrometer
indicating/non-indicating drain
laser, magnetic and spirit levels
press fit,
pressure reducing valves
pressure relief valves
pipe stand
quick opening devices
refractometer test and drain valves
square
straight edge
T-drill
tape measure
test blanks
thread depth gauge
torque wrench
variety of standard spray sprinkler heads
water post indicators
wet, dry, deluge and pre-action alarm valves & trim

SPRINKLER & FIRE PROTECTION INSTALLER

Level 1 - Summary of Minimum Recommended Equipment

air hood	heaters gloves
apron	hydrometer
adapter fittings	indicating/non-indicating drain
backflow devices	line-up bars
bench vice	ladders
boots	laser, magnetic and spirit levels
brushes	mask (particle, vapor)
ball valves	mechanical pipe-joining equipment
butterfly valves	measuring devices
check valves	nipple chuck
coveralls	nut drivers
compressor	oil can
choker	press fit
calibrating gauge	pressure reducing valves
calculator	pressure relief valves
calipers	pipe cutter
computer	pipe stand
cutters	paint brushes
chisels	pick
die and chasers	pigtail
drills	pliers
depth gauge	plum bob
drafting equipment	pry bar
die equipment	power spray-pointing equipment
ear plugs and ear muffs	power vise
electrical meters	punches
files	quick opening devices
face shield	refractometer test and drain valves
fall arrest system	rod dies
filtration mask	rope
fire blanket	reamer
fire extinguisher	reflector vest
fire hoses	respirator
fire-retardant clothing	safety glasses
feeler gauge	safety helmet
flaring tool	self-contained breathing apparatus
gate and globe valves	sling
goggles	saws
grease gun	stand chain block hoist
groovers	scrapers
grinder and attachments	screwdrivers
hydraulic bender	shovel
hoses	snips
hammers	socket sets

SPRINKLER & FIRE PROTECTION INSTALLER

soldering iron
square
straight edge
T-drill
tape measure
test blanks
thread depth gauge
torgue wrench
tamper
tag and lock-out devices
travel restraint system
tapping machine and attachments
testing pump
threading machine
utility knives
vices and clamps
vacuum (wet/dry)
variety of standard spray sprinkler heads
water post indicators
wet, dry, deluge and
pre-action alarm valves & trim
water hose
welding partition
welding, cutting, brazing equipment
water pump
wrenches

Level 2

SPRINKLER & FIRE PROTECTION INSTALLER

Reportable Subjects – Level 2

Number	Reportable Subjects	Hours Total	Hours Theory	Hours Practical
S0425	Rigging, Framing and Hoisting	12	9	3
S0426	Installation of Water Supply	75	75	0
S0427	Standpipe Fire Protection System	24	24	0
S0428	Specific Application Sprinkler Heads	30	30	0
S0429	Inspection, Testing and Maintenance of Fire Protection Systems	63	35.5	27.5
S0430	Installation of Piping Offsets	36	36	0
	Total Hours	240	209.5	30.5

SPRINKLER & FIRE PROTECTION INSTALLER

Level 2 - Reportable Subject S0425

Title: Rigging, Framing and Hoisting

Duration: 12 Total Hours

Theory: 9 Hours Practical: 3 Hours

Prerequisites: Reportable Subjects S0421, S0422, S0423, S0424

Co-requisites: None

Number	Topic	Hours Total	Hours Theory	Hours Practical
1	Rigging, Framing and Hoisting Equipment and Materials	9	6	3
2	Loading and Unloading Equipment and Materials	3	3	0
	Totals	12	9	3

SPRINKLER & FIRE PROTECTION INSTALLER

Level 2 - Reportable Subject S0425

Number: 1
Title: Rigging, Framing and Hoisting Equipment and Materials
Duration: 9 Total hours Theory: 6 hours Practical: 3 hours

Cross-Reference to Training Standard: 5442.01, 5442.03, 5442.06

General Learning Outcome:

Upon successful completion of the reportable subject, the apprentice is able to demonstrate knowledge of rigging, framing and hoisting equipment and the procedures for its use according to all applicable acts, codes, policies, procedures and standards.

Learning Outcomes and Content:

Upon successful completion the apprentice is able to:

- 1.1 Identify rigging, framing and hoisting equipment and describe their applications and safe working loads.
 - cable clamps
 - chain block hoist
 - chains
 - choker
 - come-alongs (cable or chain)
 - fork-lift
 - jacks
 - overhead hoist
 - pipe buggy
 - pipe stand
 - portable boom
 - shackles
 - slings
 - spreader bar
 - tugger
 - ratchet lever hoist
 - light duty hand hoist
 - medium duty spur geared hand hoist
 - standard single chain arrangement
 - double chain arrangement

- 1.2 Describe types of ropes and slings, their characteristics and applications.
 - natural
 - synthetic
 - wire
- 1.3 Explain purpose and the procedures for using the following equipment when framing and hoisting loads.
 - chain falls
 - come-along
 - jacks
 - trolleys
 - latch and matchlock hooks
 - slings
 - shackles
 - clevises
 - power lifts
 - leveling equipment
 - fastening equipment
 - safety equipment
- 1.4 Explain how to disconnect, remove and secure lifting devices and equipment.
- 1.5 Explain how and where to store the rigging, framing and hoisting equipment.

SPRINKLER & FIRE PROTECTION INSTALLER

Level 2 - Reportable Subject S0425

Number: 2
Title: Loading and Unloading Equipment and Materials
Duration: 3 Total Hours Theory: 3 Hours Practical: 0 Hours

Cross-Reference to Training Standard: 5442.02, 5442.04, 5442.05

General Learning Outcome:

Upon successful completion of the reportable subject, the apprentice is able to demonstrate knowledge of loading and unloading equipment and materials according to all applicable acts, codes, policies, procedures and standards.

Learning Outcomes and Content:

Upon successful completion the apprentice is able to:

- 2.1 Describe how to secure and barricade the area(s) for rigging, framing and hoisting operations.
- 2.2 Explain how to coordinate with other trades when preparing for rigging, framing and hoisting operations.
- 2.3 Demonstrate the use of international hand signals.
- 2.4 Demonstrate the use of standard weight tables to determine the weight of a given load.
- 2.5 Describe how to load, move and unload equipment and materials.
 - calculation of weight of load
 - equipment selection
 - equipment setup
 - slinging
 - load placement
 - securing load
- 2.6 Identify when special rigging or hoisting may be required for given materials or pieces of equipment.
- 2.7 Explain the inspection procedures for rigging, framing and hoisting equipment and describe conditions that warrant inspections.

SPRINKLER & FIRE PROTECTION INSTALLER

Level 2 - Reportable Subject S0425 – Rigging, Framing and Hoisting

Evaluation Structure:

Theory Testing	0 %
Practical Exercises	25 %
Final Assessment	75 %

Minimum Equipment List:

cable clamps
chain block hoist
chains
choker
come-alongs
jack
ladders
pipe stand
portable boom
rope
scaffolding
shackles
slings

SPRINKLER & FIRE PROTECTION INSTALLER

Level 2 - Reportable Subject S0425

Title: Installation of Water Supply

Duration: 3 Total Hours Theory: 3 Hours Practical: 0 Hours

Prerequisites: Reportable Subjects S0421, S0422, S0423, S0424 and S0425

Co-requisites: None

Number	Topic	Hours Total	Hours Theory	Hours Practical
1	Site Excavation	3	3	0
2	Underground Piping	6	6	0
3	Thrust Blocks and Restraining Devices	9	9	0
4	Hydrants and Control Valves	12	12	0
5	Water Supply Sources	30	30	0
6	Backflow Prevention	15	15	0
	Total Hours	75	75	0

SPRINKLER & FIRE PROTECTION INSTALLER

Level 2 - Reportable Subject S0426

Number	1		
Title:	Site Excavation		
Duration:	3 Total Hours	Theory: 3 Hours	Practical: 0 Hours

Cross-Reference to Training Standard: 5446.01, 5446.02

General Learning Outcome:

Upon successful completion of the reportable subject, the apprentice is able to determine the procedures for excavating the installation site according to all applicable acts, codes, policies, procedures and standards.

Learning Outcomes and Content:

Upon successful completion the apprentice is able to:

- 1.1 Investigate local, regional and provincial restrictions and requirements for site excavation.
- 1.2 Describe the procedure for determining the location of existing utility lines.
 - hydro
 - telephone
 - cable
 - gas
 - water
 - site services
- 1.3 Describe various shoring systems and how soil type affects shoring of trenches.
 - hydraulic
 - timber
 - trench box
- 1.4 Explain when shoring is to be installed in the excavation process.
- 1.5 Explain the guidelines for placement of shoring and excavation tools, equipment, materials, soil and barricades.
- 1.6 Describe the situations that affect trench stability causing cave-ins.
- 1.7 Explain why trench shoring, ground surface and adjacent areas should be inspected regularly.

SPRINKLER & FIRE PROTECTION INSTALLER

Level 2 - Reportable Subject S0426

Number: 2
Title: Underground Piping
Duration: 6 Total Hours Theory: 6 Hours Practical: 0 Hours

Cross-Reference to Training Standard: 5446.05, 5446.08, 5448.01

General Learning Outcome:

Upon successful completion of the reportable subject, the apprentice is able to identify the methods of installing underground piping according to all applicable acts, codes, policies, procedures and standards.

Learning Outcomes and Content:

Upon successful completion the apprentice is able to:

- 2.1 Describe the various types of pipe and joining methods used when installing a private fire service main.
- 2.2 Describe factors to be considered in determining the class and type of pipe for a particular job.
 - working pressure
 - laying conditions
 - soil conditions
 - corrosion
 - external loads
- 2.3 Describe the factors that govern laying and protecting underground piping in private fire service mains.
- 2.4 Describe testing and flushing procedures for new and existing underground piping.
- 2.5 Explain how and when shoring is to be installed within the excavation process.
- 2.6 Describe the situations that affect trench stability cause cave-ins.
- 2.7 Explain why trench shoring, ground surface and areas adjacent should be inspected regularly.

SPRINKLER & FIRE PROTECTION INSTALLER

Level 2 - Reportable Subject S0426

Number 3
Title: Thrust Blocks and Restraining Devices
Duration: 9 Total Hours Theory: 9 Hours Practical: 0 Hours

Cross-Reference to Training Standard: 5446.06

General Learning Outcome:

Upon successful completion of the reportable subject, the apprentice is able to describe installation of thrust blocks and restraining devices according to all applicable acts, codes, policies, procedures and standards.

Learning Outcomes and Content:

Upon successful completion the apprentice is able to:

- 3.1 Describe the approved methods and devices used to restrain fire service mains against movement.
- 3.2 Explain how the type of pipe, soil conditions and available space determine the restraining method to be used.
- 3.3 Explain the purpose of cleaning and coating restraining devices with corrosion-retarding materials.
- 3.4 Explain that concrete thrust blocks are utilized in combination with tie rods, structural anchoring, thrust collars, and restrained joints.

SPRINKLER & FIRE PROTECTION INSTALLER

Level 2 - Reportable Subject S0426

Number: 4
Title: Hydrants and Control Valves
Duration: 12 Total Hours Theory: 12 Hours Practical: 0 Hours

Cross-Reference to Training Standard: 5446.07

General Learning Outcome:

Upon successful completion of the reportable subject, the apprentice is able to determine the procedures for the installation of hydrants and control valves including yard and wall hydrants in accordance with drawings and specifications and according to all applicable acts, codes, policies, procedures and standards.

Learning Outcomes and Content:

Upon successful completion the apprentice is able to:

- 4.1 Describe two types of hydrants commonly used in private fire service mains and under what conditions they are installed.
- 4.2 Describe the functions of the various parts of the hydrants.
- 4.3 Determine the location to hydrants in private fire service mains.
- 4.4 Explain how to set, maintain and test fire hydrants.
- 4.5 Describe care and maintenance procedures for fire hydrants.
 - lubrication
 - painting
 - flushing
 - hydrant housing
 - freezing prevention
 - checking for leaks
 - main valve
 - drip valve
 - water mains
- 4.6 Describe installation requirements for hydrant houses.

SPRINKLER & FIRE PROTECTION INSTALLER

Level 2 - Reportable Subject S0426

Number: 5
Title: Water Supply Sources
Duration: 30 Total Hours Theory: 30 Hours Practical: 0 Hours

Cross-Reference to Training Standard: 5444.01, 5444.02, 5444.03, 5444.04, 5446.03
5446.04, 5446.09

General Learning Outcome:

Upon successful completion of the reportable subject, the apprentice is able to determine water supply from plans and water flow test data according to all applicable acts, codes, policies, procedures and standards.

Learning Outcomes and Content:

Upon successful completion the apprentice is able to:

- 5.1 Describe the characteristics and properties of water.
- 5.2 Describe types of water supply used for sprinkler and hose systems.
 - municipal
 - tanks
 - reservoir
- 5.3 Describe installation procedures for alternative water supply.
- 5.4 Describe pump requirements for alternative water supply.
- 5.5 Explain the relationship of occupancy classification to water supply requirements.
- 5.6 Describe fire department connections and their installation requirements.
 - sizing
 - hose thread connections
 - check valves
 - additional components
- 5.7 Describe flow test procedure used to determine water flow data for fire protection systems.
- 5.8 Determine weights and volumes of cylinders and rectangular tanks or reservoirs.

SPRINKLER & FIRE PROTECTION INSTALLER

Level 2 - Reportable Subject S0426

Number: 6
Title: Backflow Prevention
Duration: 15 Total Hours Theory: 15 Hours Practical: 0 Hours

Cross-Reference to Training Standard: 5446.10

General Learning Outcome:

Upon successful completion of the reportable subject, the apprentice is able to recognize cross-connection points and the proper backflow prevention application for each situation according to all applicable acts, codes, policies, procedures and standards.

Learning Outcomes and Content:

Upon successful completion the apprentice is able to:

- 6.1 Explain the purpose of backflow and cross-connection valves to maintain the integrity of the potable water source.
 - health hazards
 - liability
- 6.2 Describe regulations and codes relating to cross connection control and back flow prevention devices on fire protection systems.
 - installation
 - maintenance
 - testing
- 6.3 Determine the type of backflow prevention requirements for specific fire protection systems.
 - raw water source
 - automatic source drawing raw
 - systems containing additives
- 6.4 Describe the procedures and components required when installing double backflow prevention valves.
 - double check
 - reduced-pressure

SPRINKLER & FIRE PROTECTION INSTALLER

Level 2 - Reportable Subject S0426 – Installation of Water Supply

Evaluation Structure:

Theory Testing	75 %
Practical Exercises	0 %
Final Assessment	25 %

Minimum Equipment List:

backflow devices	plum bob
brushes	power spray-pointing equipment
chisels	power vise
choker	pry bar
clamps	punches
compressor	reamer
cutters	restraining glands
drills	rodding
die and chasers	rod dies
die equipment	rope
electrical meters	rubbers
files	saws
flanges glands	scrapers
gaskets	screwdrivers
grease gun	shovel
grinder and attachments	sling
groovers	snips
hammers	socket sets
heaters	soldering iron
hubs	stand chain block hoist
hydrant	T-bolts
hydraulic bender	tamper
ladders	tapping machine and attachments
line-up bars	testing pump
measuring devices	threading machine
mechanical pipe-joining equipment	underground joints
nipple chuck	underground valves
nut drivers	utility knives
oil can	vacuum (wet/dry)
paint brushes	vices and clamps
pick	water hose
pigtail	water pump
pipe cutter	welding, cutting, brazing equipment
pipe stand	wrenches
pliers	

SPRINKLER & FIRE PROTECTION INSTALLER

Level 2 - Reportable Subject S0427

Title: Standpipe Fire Protection System

Duration: 24 Total Hours Theory: 24 Hours Practical: 0 Hours

Prerequisites: Reportable Subjects S0421, S0422, S0423, S0424

Co-requisites: None

Number	Topic	Hours Total	Hours Theory	Hours Practical
1	Installation of Standpipe Fire Protection System	18	18	0
2	Testing and Maintenance of Standpipe Fire Protection System	6	6	0
	Total Hours	24	24	0

SPRINKLER & FIRE PROTECTION INSTALLER

Level 2 - Reportable Subject S0427

Number: 1
Title: Installation of Standpipe Fire Protection System
Duration: 18 Total Hours Theory: 18 Hours Practical: 0 Hours

Cross-Reference to Training Standard: 5449.04

General Learning Outcome:

Upon successful completion of the reportable subject, the apprentice is able to determine the installation requirements of a standpipe system and components according to all applicable acts, codes, policies, procedures and standards.

Learning Outcomes and Content:

Upon successful completion the apprentice is able to:

- 1.1 Determine the installation requirements of a combined sprinkler-standpipe system.
 - cross-zoning
 - pipe sizing
- 1.2 Describe the characteristics of standpipe classifications.
 - Class I
 - Class II
 - Class III
- 1.3 Describe the installation requirements for the different standpipe classifications.
 - Class I
 - Class II
 - Class III

SPRINKLER & FIRE PROTECTION INSTALLER

Level 2 - Reportable Subject S0427

Number 2
Title: Testing and Maintenance of Standpipe Fire Protection System
Duration: 6 Total Hours Theory: 6 Hours Practical: 0 Hours

Cross-Reference to Training Standard: 5453.0, 5450.0

General Learning Outcome:

Upon successful completion of the reportable subject, the apprentice is able to determine the testing and maintenance requirements of a standpipe system and components according to all applicable acts, codes, policies, procedures and standards.

Learning Outcomes and Content:

Upon successful completion the apprentice is able to:

- 2.1 Explain the procedures for the routine inspection and testing of standpipe and hose systems.
 - acceptance
 - inspection
- 2.2 Describe the checkpoints and corrective actions used to determine that hose and components are free of corrosion, foreign material, physical damage, water damage, tampering, or other conditions that could prevent operation.

Level 2 - Reportable Subject S0427 – Standpipe Fire Protection System

Evaluation Structure:

Theory Testing	50 %
Practical Exercises	0 %
Final Assessment	50 %

Minimum Equipment List:

adapter fittings	pipe cutter
brushes	pipe stand
calibrating gauge	Pitot tubes
chisels	play pipes
choker	pliers
cutters	plum bob
compressor	power spray-pointing equipment
die and chasers	power vise
die equipment	pressure gauge kit
drills	pressure reducing valves
electrical meters	pry bar
files	punches
fire hoses	reamer
fire hose cabinets	restrictive orifice disc
fire hose valves	rod dies
grease gun	rope
grinder and attachments	saws
groovers	scrapers
hammers	screwdrivers
heaters	shovel
hose support brackets	sling
hose valve wrenches	snips
hydraulic bender	socket sets
ladders	soldering iron
line-up bars	stand chain block hoist
measuring devices	tamper
mechanical pipe-joining equipment	tapping machine and attachments
nipple chuck	testing pump
nozzles	threading machine
nut drivers	utility knives
oil can	vacuum (wet/dry)
paint brushes	vices and clamps
pick	water hose
pigtail	water pump

SPRINKLER & FIRE PROTECTION INSTALLER

water stops

wrenches

welding, cutting and brazing equipment

SPRINKLER & FIRE PROTECTION INSTALLER

Level 2 - Reportable Subject S0428

Title: Specific Application Sprinkler Heads

Duration: 30 Total Hours Theory: 30 Hours Practical: 0 Hours

Prerequisites: Reportable Subjects S0421, S0422, S0423, S0424

Co-requisites: None

Number	Topic	Hours Total	Hours Theory	Hours Practical
1	Installation of Specific Application Sprinkler Heads	30	30	0
	Total Hours	30	30	0

SPRINKLER & FIRE PROTECTION INSTALLER

Level 2 - Reportable Subject S0428

Number 1
Title: Installation of Specific Application Sprinkler Heads
Duration: 30 Total Hours Theory: 30 Hours Practical: 0 Hours

Cross-Reference to Training Standard: 5449.01, 5449.02, 5449.03, 5449.05, 5449.06, 5449.07, 5449.08, 5449.09, 5449.10, 5449.11, 5451.01, 5451.02, 5443.0

General Learning Outcome:

Upon successful completion of the reportable subject, the apprentice is able to select a variety of specific application sprinkler heads according to all applicable acts, codes, policies, procedures and standards.

Learning Outcomes and Content:

Upon successful completion the apprentice is able to:

- 1.1 Identify specific application sprinkler heads and describe their characteristics and applications.
 - early suppression fast response (ESFR)
 - quick response early suppression (QRES)
 - old-style/conventional
 - extended coverage
 - large drop
 - in-rack
 - attic
 - nozzles
 - open sprinkler
 - window
 - on/off
 - dry sidewall
 - dry upright
 - dry pendant
 - residential
- 1.2 Identify the performance characteristics that apply to specific application sprinkler heads.
 - deflector design/spray patterns
 - orifice sizes
 - temperature rating
 - temperature sensitivity
 - orientation

SPRINKLER & FIRE PROTECTION INSTALLER

- 1.3 Identify specific application head symbols used on blueprints, spools and other piping drawings.
- 1.4 Describe methods for protection of specific application sprinkler heads.
 - shipping
 - unpacking
 - storage
 - installation
- 1.5 Identify factors that affect maximum ceiling temperature.
- 1.6 Explain the procedures for installing specific application sprinkler heads.
- 1.7 Explain the location requirements of specific application sprinkler heads in relation to:
 - bays
 - beams
 - girders
 - joists
 - open bar joists
 - open ceilings
 - trusses
 - storage materials
- 1.8 Identify required distances between specific application sprinkler heads for specific hazards.
 - light hazard
 - ordinary hazard
 - extra hazard
- 1.9 Identify sprinkler deflector orientation and location.
 - low-pitched roofs
 - partitions
 - peaks
 - roofs
 - stair and ramps
- 1.10 Identify clearances required between piled storage materials and sprinkler deflectors.

SPRINKLER & FIRE PROTECTION INSTALLER

- 1.11 Identify the installation requirements for special situations.
- concealed spaces
 - vertical shafts
 - stairways
 - vertical openings
 - building service shafts
 - elevator hoists ways and machine rooms
 - spaces in underground floors
 - exterior docks and platforms
 - exterior roofs or canopies
 - dwelling units
 - library stockrooms
 - electrical equipment
 - ceilings types
 - fire curtains

SPRINKLER & FIRE PROTECTION INSTALLER

Level 2 - Reportable Subject S0428

Evaluation Structure:

Theory Testing	50 %
Practical Exercises	0 %
Final Assessment	50 %

Minimum Equipment List:

specific application sprinkler heads
specialty sprinkler head wrenches

SPRINKLER & FIRE PROTECTION INSTALLER

Level 2 - Reportable Subject S0429

Title: Inspection, Testing and Maintenance Fire Protection Systems

Duration: 63 Total Hours Theory: 35.5 Hours Practical: 27.5 Hours

Prerequisites: Reportable Subjects S0421, S0422, S0423, S0424 and S0428

Co-requisites: None

Number	Topic	Hours Total	Hours Theory	Hours Practical
1	Installation and Maintenance of Tamper, Flow and Pressure Devices	6	4	2
2	Trim Wet and Dry Pipe Valves	27	6	21
3	Shutdown of Fire Protection System	6	6	0
4	Inspection, Testing and Maintenance of Sprinkler Heads	3	3	0
5	Inspection and Testing of Sprinkler System Components	6	6	0
6	Installation and Service of Portable Extinguishers	3	3	0
7	Maintenance of Portable Extinguisher Components	3	1.5	1.5
8	Restore Fire Protection Systems	3	3	0
9	Troubleshoot Fire Protection Systems	6	3	3
	Total Hours	63	35.5	27.5

SPRINKLER & FIRE PROTECTION INSTALLER

Level 2 - Reportable Subject S0429

Number: 1
Title: Installation and Maintenance of Tamper, Flow and Pressure Devices
Duration: 6 Total Hours Theory: 4 Hours Practical: 2 Hours

Cross-Reference to Training Standard: 5451.05

General Learning Outcome:

Upon successful completion of the reportable subject, the apprentice is able to select, install and maintain tamper, flow and pressure devices for fire protection systems according to all applicable acts, codes, policies, procedures and standards.

Learning Outcomes and Content:

Upon successful completion the apprentice is able to:

- 1.1 Install or test alarm devices using standard or specialized tools and equipment.
 - tamper switches
 - low air and water pressure switches
 - low water level switches
 - low and high temperature switch
 - loss of power switch
 - paddle flow switches
 - water motor gong

SPRINKLER & FIRE PROTECTION INSTALLER

Level 2 - Reportable Subject S0429

Number: 2
Title: Trim Alarm and Dry Pipe Valves
Duration: 27 Total hours Theory: 6 Hours Practical: 21 Hours

Cross-Reference to Training Standard: 5449.01, 5449.02, 5449.03, 5449.04, 5449.05,
5449.06, 5449.07, 5449.08, 5449.09, 5449.10,
5449.11, 5443.02, 5443.03, 5454.06, 5454.08

General Learning Outcome:

Upon successful completion of the reportable subject, the apprentice is able to trim, test and reset alarm and dry pipe valves according to all applicable acts, codes, policies, procedures and standards.

Learning Outcomes and Content:

Upon successful completion the apprentice is able to:

- 2.1 Identify alarm valves to be trimmed and their relevant design characteristics.
- 2.2 Perform installation of alarm valve trim.
 - location of alarm valves
 - trim and accessories required
- 2.3 Identify dry pipe valves to be trimmed and describe their relevant design characteristics.
 - location of dry pipe valves
 - trim and accessories required
- 2.4 Select dry pipe valve trim components.
- 2.5 Perform installation of dry pipe valve trim.
- 2.6 Describe procedures used to test and reset alarm and dry pipe valves.
- 2.7 Develop an isometric drawing of wet valve and dry valve installations.

SPRINKLER & FIRE PROTECTION INSTALLER

Level 2 - Reportable Subject S0429

Number 3
Title: Shutdown of Fire Protection System
Duration: 6 Total hours Theory: 6 Hours Practical: 0 Hours

Cross-Reference to Training Standard: 5453.0

General Learning Outcome:

Upon successful completion of the reportable subject, the apprentice is able to determine shut down procedures prior to servicing, shutting down and restoring to service fire protection systems according to all applicable acts, codes, policies, procedures and standards.

Learning Outcomes and Content:

Upon successful completion the apprentice is able to:

- 3.1 Determine the shut down requirements of fire protection system for job application.
- 3.2 Explain how authorities are notified prior to servicing or shut down of the fire protection system.
 - local fire department
 - insurance organization
 - client or client representative
 - monitoring companies
- 3.3 Explain why the authority having jurisdiction, the fire department and the alarm receiving facility shall be notified when the system, supply, or component is returned to service.

SPRINKLER & FIRE PROTECTION INSTALLER

Level 2 - Reportable Subject S0429

Number: 4
Title: Inspection, Testing and Maintenance of Sprinkler Heads
Duration: 3 Total hours Theory: 3 Hours Practical: 0 Hours

Cross-Reference to Training Standard: 5454.01, 5454.02, 5454.03, 5454.04, 5454.06

General Learning Outcome:

Upon successful completion of the reportable subject, the apprentice is able to visually inspect the sprinkler heads and related piping to assess system condition and determine deficiencies prior to performing tests according to all applicable acts, codes, policies, procedures and standards.

Learning Outcomes and Content:

Upon successful completion the apprentice is able to:

- 4.1 Identify the service/maintenance requirements in accordance with manufacturer's data sheets.
 - preventative maintenance
 - corrective maintenance
 - emergency maintenance
- 4.2 Visually inspect sprinkler heads and related piping for the following:
 - corrosion
 - foreign materials
 - paint
 - orientation
 - spacing
- 4.3 Determine that proper spacing has been applied and that obstruction does not exist.
- 4.4 Determine the type of heads used throughout the site and the date of installation.
- 4.5 Determine the supply of spare sprinkler heads is adequate and the proper wrenches available.

SPRINKLER & FIRE PROTECTION INSTALLER

Level 2 - Reportable Subject S0429

Number: 5
Title: Inspection and Testing of System Components
Duration: 6 Total Hours Theory: 6 Hours Practical: 0 Hours

Cross-Reference to Training Standard: 5454.01, 5454.02, 5454.03, 5454.04, 5454.05, 5454.06, 5454.07, 5454.09

General Learning Outcome:

Upon successful completion of the reportable subject, the apprentice is able to visually inspect and test sprinkler system components according to all applicable acts, codes, policies, procedures and standards.

Learning Outcomes and Content:

Upon successful completion the apprentice is able to:

- 5.1 Identify the service/maintenance requirements in accordance with manufacturer's data sheets.
 - preventative maintenance
 - corrective maintenance
 - emergency maintenance
- 5.2 Determine the condition of system piping and fittings.
 - mechanical damage
 - leakage
 - misalignment
 - corrosion
 - external loads
- 5.3 Determine condition and spacing of hangers and braces.
 - load
 - attachment requirements
 - seismic
- 5.4 Describe the location and position of gauges in relationship to fire protection systems.
- 5.5 Describe the range capabilities of all gauges.
- 5.6 Describe testing procedures of gauges.

SPRINKLER & FIRE PROTECTION INSTALLER

Level 2 - Reportable Subject S0429

Number 6
Title: Installation and Service of Portable Extinguishers
Duration: 3 Total Hours Theory: 3 Hours Practical: 0 Hours

Cross-Reference to Training Standard: 5452.01, 5452.02

General Learning Outcome:

Upon successful completion of the reportable subject, the apprentice is able to select portable extinguishers according to all applicable acts, codes, policies, procedures and standards.

Learning Outcomes and Content:

Upon successful completion the apprentice is able to:

- 6.1 Identify the service/maintenance requirements in accordance with manufacturer's data sheets.
 - preventative maintenance
 - corrective maintenance
 - emergency maintenance
- 6.2 Identify portable fire extinguishers and describe their characteristics.
 - carbon dioxide
 - water and dry chemical
 - clean agent
- 6.3 Describe the installation procedures applicable to given site locations.
 - determine applicable type
 - number of units
 - spacing
- 6.4 Describe testing procedures for portable extinguishers.
 - tagging the date of inspection
 - evaluate condition of extinguishers
 - recording inspection date

SPRINKLER & FIRE PROTECTION INSTALLER

Level 2 - Reportable Subject S0429

Number 7
Title: Maintenance of Portable Extinguisher Components
Duration: 3 Total Hours Theory: 1.5 Hours Practical: 1.5 Hours

Cross-Reference to Training Standard: 5452.03, 5452.04

General Learning Outcome:

Upon successful completion of the reportable subject, the apprentice is able to maintain portable extinguisher components and recharge extinguishers according to all applicable acts, codes, policies, procedures and standards.

Learning Outcomes and Content:

Upon successful completion the apprentice is able to:

- 7.1 Identify the service/maintenance requirements in accordance with manufacturer's data sheets.
 - preventative maintenance
 - corrective maintenance
 - emergency maintenance
- 7.2 Repair and/or replace broken or defective parts of extinguisher components.
 - broken seals
 - gauges
 - brackets
 - nozzles
 - hoses
 - cylinders
- 7.3 Recharge extinguishers using approved materials and methods.

SPRINKLER & FIRE PROTECTION INSTALLER

Level 2 - Reportable Subject S0429

Number: 8
Title: Restore Fire Protection Systems
Duration: 3 Total Hours Theory: 3 Hours Practical: 0 Hours

Cross-Reference to Training Standard: 5453.01, 5453.05, 5454.02, 5454.08

General Learning Outcome:

Upon successful completion of the reportable subject, the apprentice is able to restore the operation of the fire protection system and complete required test reports according to all applicable acts, codes, policies, procedures and standards.

Learning Outcomes and Content:

Upon successful completion the apprentice is able to:

- 8.1 Verify that the operation of the fire protection system has been restored.
 - document correction of identified problems
 - report items repaired or replaced
 - report work completed
 - notify appropriate authorities
- 8.2 Prepare the required documentation of inspecting, testing and maintenance activities on fire protection systems and components.

SPRINKLER & FIRE PROTECTION INSTALLER

Level 2 - Reportable Subject S0429

Number: 9
Title: Troubleshoot the Fire Protection System
Duration: 6 Total Hours Theory: 3 Hours Practical: 3 Hours

Cross-Reference to Training Standard: 5453.01, 5453.02

General Learning Outcome:

Upon successful completion of the reportable subject, the apprentice is able to troubleshoot the fire protection system according to all applicable acts, codes, policies, procedures and standards.

Learning Outcomes and Content:

Upon successful completion the apprentice is able to:

- 9.1 Listen and interpret client's concerns.
- 9.2 Read and interpret previous records, inspection forms, reports or logs pertaining to problems.
- 9.3 Conduct a visual inspection to verify the fire system components are operational and free from physical damage.
- 9.4 Verify system problem and determine probable solutions.
- 9.5 Identify the service/maintenance requirements in accordance with manufacturer's data sheets.
 - preventative maintenance
 - corrective maintenance
 - emergency maintenance

SPRINKLER & FIRE PROTECTION INSTALLER

Level 2 - Reportable Subject S0429 – Inspection, Testing & Maintenance of Fire Protection Systems

Evaluation Structure:

Theory Testing	35 %
Practical Exercises	40 %
Final Assessment	25 %

Minimum Equipment List:

amp/volt meter	play pipes
anti-freeze solutions	pliers
backflow devices	plum bob
battery load tester	protomatic test pump
binoculars	pry bar
boots	reflector vest
brushes	refractometer
calibrated gauge	respirator
compressor	RPM reader
computer	safety glasses
coveralls	safety helmet
dry pipe and deluge valves	scrapers
ear plugs and ear muffs	screwdrivers
face shield	self-contained breathing apparatus
fall arrest system	shovel
filtration mask	site tube
fire extinguisher	socket sets
fire hoses	soldering iron
flow meter	standard spray sprinkler heads
gloves	stop watch
goggles	tachometer
grease gun	tag and lock-out devices
hammers	temperature gauge
heaters	test blanks
heat lamp	testing pump
hoses	travel restraint system
hydrometer	utility knives
ladders	vacuum (wet/dry)
mask (particle, vapor)	vice-grip
oil can	water hose
paint brushes	wet pipe alarm valves
pick	wrenches
Pitot tubes	

SPRINKLER & FIRE PROTECTION INSTALLER

Level 2 - Reportable Subject S0430

Title: Installation of Piping Offsets

Duration: 36 Total Hours Theory: 36 Hours Practical: 0 Hours

Prerequisites: Reportable Subjects S0421, S0422, S0423, S0424

Co-requisites: None

Number	Topic	Hours Total	Hours Theory	Hours Practical
1	Installation of Rolled Offsets	6	6	0
2	Installation of Linear and Travel Pipe Lengths	30	30	0
	Total Hours	36	36	0

SPRINKLER & FIRE PROTECTION INSTALLER

Reportable Subject S0430

Number: 1
Title: Installation of Rolled Offsets
Duration: 6 Total Hours Theory: 6 Hours Practical: 0 Hours

Cross-Reference to Training Standard: 5443.03, 5443.06, 5447.02, 5447.03

General Learning Outcome:

Upon successful completion of the reportable subject, the apprentice is able to perform the calculations of rolled offsets according to all applicable acts, codes, policies, procedures and standards.

Learning Outcomes and Content:

Upon successful completion the apprentice is able to:

- 1.1 Describe types of triangles and their characteristics.
 - lengths of sides
 - sum of angles
 - squaring of sides
- 1.2 Calculate the required lengths for specific applications.
 - wall brackets
 - swing joints
 - ladder angles
 - slings

SPRINKLER & FIRE PROTECTION INSTALLER

Level 2 - Reportable Subject S0430

Number 2
Title: Installation of Linear and Travel Pipe Lengths
Duration: 30 Total Hours Theory: 30 Hours Practical: 0 Hours

Cross-Reference to Training Standard: 5443.03, 5443.06, 5447.02, 5447.03

General Learning Outcome:

Upon successful completion of the reportable subject, the apprentice is able to perform piping offset calculations according to all applicable acts, codes, policies, procedures and standards.

Learning Outcomes and Content:

Upon successful completion the apprentice is able to:

- 2.1 Perform piping offset calculations for 90° and 45° fittings.
 - offset travel
 - offset advancement

SPRINKLER & FIRE PROTECTION INSTALLER

Level 2 - Reportable Subject S0430

Evaluation Structure:

Theory Testing	75 %
Practical Exercises	0 %
Final Assessment	25 %

Minimum Equipment List:

Calculator

SPRINKLER & FIRE PROTECTION INSTALLER

Level 2 – Summary of Minimum Recommended Equipment

adapter fittings	goggles
air monitoring device	grinder and attachments
amp/volt meter	groovers
anti-freeze solutions	hammers
backflow devices	heaters
back-flushing machine	heat lamp
battery load tester	hoses gloves
binnoculars	hose support brackets
boots	hose valve wrenches
brushes	hubs
cable clamps	hydraulic bender
calibrated gauge	hydrant
chains	hydrometer
chain block hoist	jack
chisels	line-up bars
choker	ladders
clamps	mask (particle, vapor)
come-alongs	measuring devices
compressor	mechanical pipe-joining equipment
computer	nipple chuck
coveralls	nut drivers
cutters	oil can
deluge valves	paint brushes
die and chasers	pick
die equipment	pigtail
drills	pipe cutter
dry pipe valves	pipe stand
ear plugs and ear muffs	Pitot tubes
electrical meters	play pipes
face shield	pliers
fall arrest system	plum bob
files	portable boom
filtration mask	power spray-pointing equipment
fire extinguisher	power vise
fire hoses	pressure gauge kit
fire hose cabinets	pressure reducing valves
fire hoses nozzles	protomatic test pump
fire hose valves	pry bar
flanges	punches
flow meter	reamer
gaskets	refractometer
grease gun	reflector vest
glands	

SPRINKLER & FIRE PROTECTION INSTALLER

respirator	tag and lock-out devices
restraining glands	tamper
restrictive orifice disc	tapping machine and attachments
rod dies	temperature gauge
rodding	test blanks
rope	testing pump
RPM reader	threading machine
rubbers	travel restraint system
safety glasses	two-way radio
safety helmet	underground joints
saws	underground valves
scaffolding	utility knives
scrapers	vacuum (wet/dry)
screwdrivers	vices and clamps
self-contained breathing apparatus	water hose water hose
shackles	water pump
shovel	water stops
site tube	welding, cutting, brazing equipment
slings	wet pipe alarm valves
snips	wrenches
socket sets	
soldering iron	
specialty sprinkler head wrenches	
specific application sprinkler heads	
standard spray sprinkler heads	
stand chain block hoist	
stop watch	
tachometer	
T-bolts	

Level 3

SPRINKLER & FIRE PROTECTION INSTALLER

Reportable Subjects – Level 3

Number	Reportable Subjects	Hours Total	Hours Theory	Hours Practical
S0431	Design Systems	48	36	12
S0432	Installation of Pumps, Drivers and Controllers	72	72	0
S0433	Detection and Actuation Devices	48	33	15
S0434	Specific Application Fire Protection Systems	42	42	0
S0435	Communication and Documentation	30	15	15
	Total Hours	240	198	42

SPRINKLER & FIRE PROTECTION INSTALLER

Level 3 - Reportable Subject S0431

Title: Design Systems

Duration: 48 Total Hours Theory: 36 Hours Practical: 12 Hours

Prerequisites: Reportable Subjects S0421, S0422, S0423, S0424, S0425, S0426, S0427, S0428, S0429, S0430

Co-requisites: None

Number	Topic	Hours Total	Hours Theory	Hours Practical
1	Occupancy Classification & Design Criteria	12	12	0
2	System Hydraulic Calculations	24	24	0
3	Design Documentation	12	0	12
	Total Hours	48	36	12

SPRINKLER & FIRE PROTECTION INSTALLER

Level 3 - Reportable Subject S0431

Number: 1
Title: Occupancy Classification and Design Criteria
Duration: 12 Total Hours Theory: 12 Hours Practical: 0 Hours

Cross-Reference to Training Standard: 5444.01

General Learning Outcome:

Upon successful completion of the reportable subject, the apprentice is able to determine occupancy classification and design criteria according to all applicable acts, codes, policies, procedures and standards.

Learning Outcomes and Content:

Upon successful completion the apprentice is able to:

- 1.1 List and describe the classifications of occupancies.
- 1.2 Identify special occupancy conditions.
 - high piles of combustible stocks
 - flammable and combustible liquids
 - combustible dusts and fibers
 - large quantities of light, loose combustible materials
 - chemicals and explosives
- 1.3 Identify hazard categories and describe their characteristics.
 - light
 - ordinary
 - extra
 - unique content
- 1.4 Explain how a building's occupancy classification affects the design criteria of the sprinkler system and water supply.

SPRINKLER & FIRE PROTECTION INSTALLER

Level 3 - Reportable Subject S0431

Number: 2
Title: System Hydraulic Calculations
Duration: 24 Total Hours Theory: 24 Hours Practical: 0 Hours

Cross-Reference to Training Standard: 5444.04

General Learning Outcome:

Upon successful completion of the reportable subject, the apprentice is able to perform system hydraulic calculations to determine friction loss and pipe sizing needed to meet the water flow requirements of the design criteria according to all applicable acts, codes, policies, procedures and standards.

Learning Outcomes and Content:

Upon successful completion the apprentice is able to:

- 2.1 Describe the basic principles of physics as they are applied to the sprinkler trade.
 - specific weight
 - specific gravity
 - difference between pressure and total force
 - total force applied in differential type valves
- 2.2 Explain the concept of pressure and the various ways we use to develop pressure in a sprinkler system
 - gravity
 - compression of air or another gas
 - centrifugal force
 - pump impellers
- 2.3 Describe static and residual pressure, the concepts of flow rate and velocity, and the requirements for uncalculated systems
- 2.4 Identify the causes of pressure losses in sprinkler systems due to friction and how the extent of those losses is determined
- 2.5 Explain how to calculate requirements for coverage area and spray density for the various occupancy hazards.
- 2.6 Establish the volume of water that must be provided by the various automatic supplies in various occupancy classifications.
 - pipe schedule method
 - area/density method
 - room design method

SPRINKLER & FIRE PROTECTION INSTALLER

Level 3 - Reportable Subject S0431

Number: 3
Title: Design Documentation
Duration: 12 Total Hours Theory: 12 Hours Practical: 0 Hours

Cross-Reference to Training Standard: 5444.05, 5443.04, 5443.05

General Learning Outcome:

Upon successful completion of the reportable subject, the apprentice is able to prepare working plans for approval to the authority having jurisdiction before any equipment is installed or remodeled according to all applicable acts, codes, policies, procedures and standards.

Learning Outcomes and Content:

Upon successful completion the apprentice is able to:

- 3.1 Identify standard types of construction trade drawings and prints.
- 3.2 Create a working plan and elevation view drawings of a typical sprinkler system installation.
 - establish design criteria
 - sprinkler head location
 - distribution piping
 - scaling and dimensioning
 - symbols and abbreviations
 - riser detail
- 3.3 Compile a list of materials.

SPRINKLER & FIRE PROTECTION INSTALLER

Level 3 - Reportable Subject S0431 – Design Systems

Evaluation Structure:

Theory Testing	50 %
Practical Exercises	25 %
Final Assessment	25 %

Minimum Equipment List:

calculator
computer
drafting paper, pencils, erasers
flow charts
scale rules
software
T squares
30/60 triangles

SPRINKLER & FIRE PROTECTION INSTALLER

Level 3 - Reportable Subject S0432

Title: Installation of Pumps, Drivers and Controllers

Duration: 72 Total Hours Theory: 72 Hours Practical: 0 Hours

Prerequisites: Reportable Subjects S0421, S0422, S0423, S0424, S0425, S0426, S0427, S0428, S0429, S0430

Co-requisites: None

Number	Topic	Hours Total	Hours Theory	Hours Practical
1	Fire Pumps and Controllers	24	24	0
2	Secondary Water Supply	36	36	0
3	Fuel System Installation	6	6	0
4	Batteries, Supports and Shields	6	6	0
	Total Hours	72	72	0

SPRINKLER & FIRE PROTECTION INSTALLER

Level 3 - Reportable Subject S0432

Number: 1
Title: Fire Pumps and Controllers
Duration: 24 Total Hours Theory: 24 Hours Practical: 0 Hours

Cross-Reference to Training Standard: 5450.01, 5450.02, 5450.03, 5450.04, 5450.06, 5450.08, 5450.11

General Learning Outcome:

Upon successful completion of the reportable subject, the apprentice is able to describe the procedures for installing and maintaining fire pumps and controllers according to all applicable acts, codes, policies, procedures and standards.

Learning Outcomes and Content:

Upon successful completion the apprentice is able to:

- 1.1 Identify types of pumps and describe their principles of operations and applications.
 - types of drivers
 - pump and pipe sizing
 - capacity of pumps
 - pressure ratings
 - pump performance
 - fire pump curve
 - testing requirements
 - start mechanisms
 - pre-commissioning checks
- 1.2 Describe head pressure as it relates to pumps.
- 1.3 Describe installation procedures for fire, booster and jockey pumps.
- 1.4 Identify types of controllers and describe their application, installation, testing and maintenance.

SPRINKLER & FIRE PROTECTION INSTALLER

- 1.5 Describe the effects of potential problems and their solutions.
- air leaks
 - cavitations
 - air pockets
 - rotation
 - drivers
 - rpm
 - pressure relief valves
- 1.6 Describe code and manufacturers' requirements for maintenance and testing of fire pumps.

SPRINKLER & FIRE PROTECTION INSTALLER

Level 3 - Reportable Subject S0432

Number 2
Title: Secondary Water Supply
Duration: 36 Total Hours Theory: 36 Hours Practical: 0 Hours

Cross-Reference to Training Standard: 5444.02, 5446.03, 5446.04, 5446.09

General Learning Outcome:

Upon successful completion of the reportable subject, the apprentice is able to describe the procedures for installing, testing, and maintaining various types of secondary water supply sources according to all applicable acts, codes, policies, procedures and standards.

Learning Outcomes and Content:

Upon successful completion the apprentice is able to:

- 2.1 Identify limited water supply conditions.
 - reservoirs
 - pressure tanks
 - gravity tanks
 - municipal
- 2.2 Describe pressure and gravity tanks and their applications.
 - locations
 - tank sizes and pressure
 - operation
 - water supply requirements
 - piping, valves, trim and accessories installation
 - electrical requirements
 - discharge and drainage pipe requirements
- 2.3 Identify basic guidelines for the care and maintenance of all types of water tanks.
- 2.4 Explain the procedures for inspecting and testing water storage tanks.
 - heating system
 - temperature limit switches
 - high and low water level alarms
 - pressure gauges
- 2.5 Verify the flushing and testing of the water supply pipe.
 - contractor's test and material certificates
 - chlorinating certificates
 - back-up flow analysis

SPRINKLER & FIRE PROTECTION INSTALLER

Level 3 - Reportable Subject S0432

Number 3
Title: Fuel System Installation
Duration: 6 Total Hours Theory: 6 Hours Practical: 0 Hours

Cross-Reference to Training Standard: 5450.07, 5450.09

General Learning Outcome:

Upon successful completion of the reportable subject, the apprentice is able to describe the procedures to select and install a fuel system according to all applicable acts, codes, policies, procedures and standards.

Learning Outcomes and Content:

Upon successful completion the apprentice is able to:

- 3.1 Describe the procedures to select, coordinate and install a fuel and components.
 - fuel source
 - emission exhaust
 - ventilation
 - storage tanks
 - exhaust piping
- 3.2 Describe the procedures for the installation of protection devices for fuel links to prevent impairment.

SPRINKLER & FIRE PROTECTION INSTALLER

Level 3 - Reportable Subject S0432

Number 4
Title: Batteries, Battery Supports and Shields
Duration: 6 Total Hours Theory: 6 Hours Practical: 0 Hours

Cross-Reference to Training Standard: 5450.10

General Learning Outcome:

Upon successful completion of the reportable subject, the apprentice is able to determine the installation and maintenance requirements for batteries, battery supports and shields according to all applicable acts, codes, policies, procedures and standards.

Learning Outcomes and Content:

Upon successful completion the apprentice is able to:

- 4.1 Install batteries, battery supports and shields.
- 4.2 Perform required maintenance on batteries, supports and shields.

SPRINKLER & FIRE PROTECTION INSTALLER

Level 3 - Reportable Subject S0432 – Installation of Pumps, Drivers and Controllers

Evaluation Structure:

Theory Testing	75 %
Practical Exercises	0 %
Final Assessment	25 %

Minimum Equipment List:

adapter fittings
amp/volt meter
battery load tester
calibrating gauge
computer
differential pressure gauge
fire pump and controller
flow meter
hoses
Pitot tubes
play pipes
pressure gauge kit
RPM reader
stop watch
tachometer
temperature gauge
test hoses and securement
two-way radio
water supply source

SPRINKLER & FIRE PROTECTION INSTALLER

Level 3 - Reportable Subject S0433

Title: **Detection and Actuation Devices**

Duration: 48 Total Hours Theory: 33 Hours Practical: 15 Hours

Prerequisites: Reportable Subjects S0421, S0422, S0423, S0424, S0425, S0426, S0427, S0428, S0429, S0430

Co-requisites: None

Number	Topic	Hours Total	Hours Theory	Hours Practical
1	Fixed Temperature Detection and Actuation Devices	21	15	6
2	Rate of Rise and Combination Detection and Actuation Devices	21	15	6
3	Manual Activation Devices	6	3	3
	Total Hours	48	33	15

SPRINKLER & FIRE PROTECTION INSTALLER

Level 3 - Reportable Subject S0433

Number: 1
Title: Fixed Temperature Detection and Actuation Devices
Duration: 21 Total Hours Theory: 15 Hours Practical: 6 Hours

Cross-Reference to Training Standard: 5451.01, 5451.06

General Learning Outcome:

Upon successful completion of the reportable subject, the apprentice is able to install and determine the maintenance requirements for fixed temperature detection and actuation devices according to all applicable acts, codes, policies, procedures and standards.

Learning Outcomes and Content:

Upon successful completion the apprentice is able to:

- 1.1 Identify and select fixed temperature detection and actuation devices.
 - wet and dry pilot detector and actuators
 - electric solenoids
 - foam actuation devices
 - protecto wire systems
- 1.2 Explain installation and maintenance procedures for fixed temperature detection and actuation devices.
 - wet and dry pilot detector and actuators
 - electric solenoids
 - foam actuation devices
 - protecto wire systems

SPRINKLER & FIRE PROTECTION INSTALLER

Level 3 - Reportable Subject S0433

Number: 2
Title: Rate of Rise and Combination Detection and Actuation Devices
Duration: 21 Total Hours Theory: 15 Hours Practical: 6 Hours

Cross-Reference to Training Standard: 5451.02, 5451.04, 5451.06

General Learning Outcome:

Upon successful completion of the reportable subject, the apprentice is able to install and determine the maintenance requirements for rate of rise and combination detection and actuation devices according to all applicable acts, codes, policies, procedures and standards.

Learning Outcomes and Content:

Upon successful completion the apprentice is able to:

- 2.1 Identify and select rate of rise and combination detection and actuation devices.
 - pneumatic
 - electric
 - hydraulic

- 2.2 Explain installation and maintenance procedures for rate of rise and combination detection and actuation devices.
 - pneumatic
 - electric
 - hydraulic

SPRINKLER & FIRE PROTECTION INSTALLER

Level 3 - Reportable Subject S0433

Number 3
Title: Manual Activation Devices
Duration: 6 Total Hours Theory: 3 Hours Practical: 3 Hours

Cross-Reference to Training Standard: 5451.03, 5451.04

General Learning Outcome:

Upon successful completion of the reportable subject, the apprentice is able to install and determine the maintenance requirements for manual activation devices according to all applicable acts, codes, policies, procedures and standards.

Learning Outcomes and Content:

Upon successful completion the apprentice is able to:

- 3.1 Identify and select manual activation devices.
- 3.2 Explain installation and maintenance procedures for manual activation devices.

SPRINKLER & FIRE PROTECTION INSTALLER

Level 3 - Reportable Subject S0433 – Detection and Activation Devices

Evaluation Structure:

Theory Testing	45 %
Practical Exercises	30 %
Final Assessment	25 %

Minimum Equipment List:

air sampling devices
amp/volt meter
aspiration detection devices
boots
coveralls
ear plugs and ear muffs
protomatic test pump
face shield
fall arrest system
fire extinguisher
fixed temperature detection devices
gloves
goggles
heat lamp
hydrometer
manometer
manual pull stations
masks
rate of rise detection devices
reflector vest
respirator
safety glasses
self-contained breathing apparatus
smoke bomb
tag and lock-out devices
temperature gauge
testing pump

SPRINKLER & FIRE PROTECTION INSTALLER

Level 3 - Reportable Subject S0434

Title: SPECIFIC APPLICATION FIRE PROTECTION SYSTEMS

Duration: 42 Total Hours Theory: 42 Hours Practical: 0 Hours

Prerequisites: Reportable Subjects S0421, S0422, S0423, S0424, S0425, S0426, S0427, S0428, S0429, S0430

Co-requisites: None

Number	Topic	Hours Total	Hours Theory	Hours Practical
1	Dry and Wet Chemical Systems	6	6	0
2	Fixed Water Spray Systems	6	6	0
3	Water Mist Systems	6	6	0
4	Foam Extinguishing Systems	6	6	0
5	Carbon Dioxide Systems	6	6	0
6	Clean Agent Extinguishing Systems	6	6	0
7	Outside Exposure Systems	6	6	0
	Total Hours	42	42	0

SPRINKLER & FIRE PROTECTION INSTALLER

Level 3 - Reportable Subject S0434

Number: 1
Title: Dry and Wet Chemical Systems
Duration: 6 Total Hours Theory: 6 Hours Practical: 0 Hours

Cross-Reference to Training Standard: 5449.03, 5449.12

General Learning Outcome:

Upon successful completion of the reportable subject, the apprentice is able to determine the installation and maintenance requirements for dry and wet chemical systems according to all applicable acts, codes, policies, procedures and standards.

Learning Outcomes and Content:

Upon successful completion the apprentice is able to:

- 1.1 Identify types of dry and wet chemical systems and describe their operating principles and applications.
 - methods of dispensing dry and wet chemicals
 - applications and action of expellant gas
 - extinguishing properties
 - handling and storage
- 1.2 Describe fixed pipe systems.
 - total flooding
 - local application
- 1.3 Describe common installation requirements of all dry and wet chemical systems.
 - codes and regulations
 - materials
 - supports and hangers
 - systems actuation
 - testing
 - servicing

SPRINKLER & FIRE PROTECTION INSTALLER

Level 3 - Reportable Subject S0434

Number: 2
Title: Fixed Water Spray Systems
Duration: 6 Total Hours Theory: 6 Hours Practical: 0 Hours

Cross-Reference to Training Standard: 5449.09, 5449.12

General Learning Outcome:

Upon successful completion of the reportable subject, the apprentice is able to determine the installation and maintenance requirements for fixed water spray systems according to all applicable acts, codes, policies, procedures and standards.

Learning Outcomes and Content:

Upon successful completion the apprentice is able to:

- 2.1 Describe fixed water spray systems and their operating principles.
 - applications
 - codes and regulations
 - water supply required
 - design of system
 - water spray nozzles characteristics and applications
 - exposure protection
- 2.2 Describe installation requirements for fixed water spray systems.
 - codes and regulations
 - materials
 - supports
 - system actuation
 - testing
 - servicing
 - manufacturers' specifications
- 2.3 Describe the system controls for the fixed water spray system and installation.
- 2.4 Explain the requirements for leak testing the system.
- 2.5 Explain the requirements for drainage of the system.
- 2.6 Describe service and maintenance procedures for a fixed water spray system.

SPRINKLER & FIRE PROTECTION INSTALLER

Level 3 - Reportable Subject S0434

Number: 3
Title: Water Mist Systems
Duration: 6 Total Hours Theory: 6 Hours Practical: 0 Hours

Cross-Reference to Training Standard: 5449.11, 5449.12

General Learning Outcome:

Upon successful completion of the reportable subject, the apprentice is able to determine the installation and maintenance requirements for water mist systems according to all applicable acts, codes, policies, procedures and standards.

Learning Outcomes and Content:

Upon successful completion the apprentice is able to:

- 3.1 Describe water mist systems and their operating principles.
 - applications
 - codes and regulations
 - water supply required
 - design of system
 - characteristics and selection of water spray nozzles
 - exposure protection
- 3.2 Describe installation requirements for water mist systems.
 - codes and regulations
 - materials
 - supports
 - system actuation
 - testing
 - servicing
 - manufacturers' specifications
- 3.3 Describe the system controls for water mist system and installation.
- 3.4 Explain the requirements for leak testing the system.
- 3.5 Explain the requirements for drainage of the system.
- 3.6 Describe service and maintenance procedures for a fixed water spray system.

SPRINKLER & FIRE PROTECTION INSTALLER

Level 3 - Reportable Subject S0434

Number: 4
Title: Foam Extinguishing System
Duration: 6 Total Hours Theory: 6 Hours Practical: 0 Hours

Cross-Reference to Training Standard: 5449.10, 5449.12

General Learning Outcome:

Upon successful completion of the reportable subject, the apprentice is able to determine the installation and maintenance requirements for foam extinguishing systems according to all applicable acts, codes, policies, procedures and standards.

Learning Outcomes and Content:

Upon successful completion the apprentice is able to:

- 4.1 Describe foam extinguishing systems and their operating principles.
 - applications
 - codes and regulations
 - water supply required
 - design of system
 - characteristics and selection of water spray nozzles
 - exposure protection
- 4.2 Describe installation requirements for foam extinguishing systems.
 - codes and regulations
 - materials
 - supports
 - system actuation
 - testing
 - servicing
 - manufacturers' specifications
- 4.3 Describe the system controls for water mist system and installation.
- 4.4 Describe the typical installation of foam extinguishing systems.
 - foam liquid storage tank and trim
 - reserve tank and trim
 - foam liquid pump
 - check valves, strainers and orifice plates
 - deluge valves
 - piping
 - cross connection control valves
 - discharge methods

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- 4.5 Explain the operation of a balanced pressure proportioning system.
- 4.6 Explain the operation of a pressure proportioning tank with and without diaphragm.
- 4.7 Describe testing and maintenance procedures for foam extinguishing systems.

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Level 3 - Reportable Subject S0434

Number 5
Title: Carbon Dioxide Systems
Duration: 6 Total Hours Theory: 6 Hours Practical: 0 Hours

Cross-Reference to Training Standard: 5449.02, 5449.12

General Learning Outcome:

Upon successful completion of the reportable subject, the apprentice is able to determine the installation and maintenance requirements for carbon dioxide systems according to all applicable acts, codes, policies, procedures and standards.

Learning Outcomes and Content:

Upon successful completion the apprentice is able to:

- 5.1 Describe carbon dioxide systems and its operating principles.
 - applications
 - codes and regulations
 - design of system
 - exposure protection
 - local application or total flooding
 - safety practices for handling, storing, testing, servicing
- 5.2 Describe the methods of system operations.
 - total flooding
 - local application
 - hand directed operation
 - actuation of each system
 - detection of fires
 - low and high pressure systems
 - supervision of system
 - working pressure
 - alarms and indicators
- 5.3 Describe the requirements for carbon dioxide.
 - amount of carbon dioxide
 - storage requirements for carbon dioxide containers
 - storage temperatures

- 5.4 Describe the requirements for the installation of the carbon dioxide system.
- codes and regulations
 - piping requirements
 - tools and materials
 - discharge nozzles
 - manufacturers' specifications
- 5.5 Identify the requirements for leak testing the carbon dioxide system.
- 5.6 Describe service, maintenance and removal procedures for carbon dioxide systems.

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Level 3 - Reportable Subject S0434

Number 6
Title: Clean Agent Extinguishing Systems
Duration: 6 Total Hours Theory: 6 Hours Practical: 0 Hours

Cross-Reference to Training Standard: 5440.01, 5449.12

General Learning Outcome:

Upon successful completion of the reportable subject, the apprentice is able to determine the installation and maintenance requirements for clean agent extinguishing systems according to all applicable acts, codes, policies, procedures and standards.

Learning Outcomes and Content:

Upon successful completion the apprentice is able to:

- 6.1 Describe clean agent extinguishing systems and their operating principles.
 - applications
 - codes and regulations
 - design of system
 - exposure protection
 - local application or total flooding
 - safety practices for handling, storing, testing and servicing
- 6.2 Identify the components used in clean agent systems.
 - quantity of agent
 - storage container requirements
 - distribution of extinguishing agents
 - pipe and materials
 - discharge nozzles
 - pressure relief venting
- 6.3 Describe detection, activation, alarm and control systems for the clean agent extinguishing system.
- 6.4 Identify inspection, testing and maintenance requirements for the clean agent extinguishing system.
- 6.5 Describe possible safety hazards.

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Level 3 - Reportable Subject S0434

Number 7
Title: Outside Exposure Systems
Duration: 6 Total Hours Theory: 6 Hours Practical: 0 Hours

Cross-Reference to Training Standard: 5449.06, 5449.12

General Learning Outcome:

Upon successful completion of the reportable subject, the apprentice is able to determine the installation and maintenance requirements for outside exposure systems according to all applicable acts, codes, policies, procedures and standards.

Learning Outcomes and Content:

Upon successful completion the apprentice is able to:

- 7.1 Describe outside exposure systems and their operating principles and applications.
- 7.2 Describe the installation requirements for outside exposure systems.
 - codes and regulations
 - water service requirements
 - methods of actuation
 - sprinkler heads
 - strainers and trim
- 7.3 Describe the requirements of hydrostatic testing of the outside exposure system.
- 7.4 Describe the requirements for drainage of the outside exposure system.
- 7.5 Describe service and maintenance procedures for outside exposure systems.

SPRINKLER & FIRE PROTECTION INSTALLER

Level 3 - Reportable Subject S0434- Specific Application Fire Protection Systems

Evaluation Structure:

Theory Testing	75 %
Practical Exercises	0 %
Final Assessment	25 %

Minimum Equipment List:

specialty fittings
variable spray nozzles

SPRINKLER & FIRE PROTECTION INSTALLER

Level 3 - Reportable Subject S0435

Title: Communication and Documentation

Duration: 30 Total Hours Theory: 15 Hours Practical: 15 Hours

Prerequisites: Reportable Subjects S0421, S0422, S0423, S0424, S0425, S0426, S0427, S0428, S0429, S0430

Co-requisites: None

Number	Topic	Hours Total	Hours Theory	Hours Practical
1	Communications	15	9	6
2	Trade Documents and Reports	15	6	9
	Total Hours	30	15	15

SPRINKLER & FIRE PROTECTION INSTALLER

Level 3 - Reportable Subject S0435

Number: 1
Title: Communications
Duration: 15 Total Hours Theory: 9 Hours Practical: 6 Hours

Cross-Reference to Training Standard: 5441.01, 5441.04, 5441.05, 5453.03, 5450.06

General Learning Outcome:

Upon successful completion of the reportable subject, the apprentice is able to demonstrate ability to communicate using trade language in verbal and written format according to all applicable acts, codes, policies, procedures and standards.

Learning Outcomes and Content:

Upon successful completion the apprentice is able to:

- 1.1 Demonstrate communication skills.
 - accept, give and respond to instructions
 - interact with co-workers, supervisors, contractors, clients, etc.
- 1.2 Describe site communication requirements and their relevance to job application.
 - site meetings
 - scheduling
 - work distribution
 - safety meetings
 - coordination of activities
 - verbal and visual signals
- 1.3 Prepare work orders to schedule site services.

Level 3 - Reportable Subject S0435

Number: 2
Title: Trade Documents and Reports
Duration: 15 Total Hours Theory: 6 Hours Practical: 9 Hours

Cross-Reference to Training Standard: 5441.02, 5441.03

General Learning Outcome:

Upon successful completion of the reportable subject, the apprentice is able to demonstrate ability to read trade documents and reports, record data and maintain documentation according to all applicable acts, codes, policies, procedures and standards.

Learning Outcomes and Content:

Upon successful completion the apprentice is able to:

- 2.1 Identify documents and reports used in the trade and describe their purpose.
 - acts and regulations
 - trade codes
 - policies and procedures
 - manufacturers' recommendations
 - time sheets
 - progress reports
 - safety forms and reports
 - test reports and certificates
 - inspection reports
 - property damage reports
- 2.2 Read and interpret trade documents identifying key information.
- 2.3 Create written or electronic reports and documents as required within the trade.

SPRINKLER & FIRE PROTECTION INSTALLER

Level 3 - Reportable Subject S0435 – Communication and Documentation

Evaluation Structure:

Theory Testing	25 %
Practical Exercises	50 %
Final Assessment	25 %

Minimum Equipment List:

calculator
computer
manuals
trade codes
trade documents

Level 3 – Summary of Minimum Recommended Equipment

adapter fittings	reflector vest
air sampling devices	respirator
amp/volt meter	safety glasses
aspiration detection devices	self-contained breathing apparatus
battery load tester	scale rules
boots	software
calculator	specialty stop watch
calibrating gauge	specialty fittings
computer	T squares
coveralls	tachometer
differential pressure gauge	tag and lock-out devices
drafting paper, pencils, erasers	temperature gauge
ear plugs and ear muffs	test hoses and securement
protomatic test pump	testing pump
face shield	trade codes
fall arrest system	trade documents
fire extinguisher	two-way radio
fire pump and controller	30/60 triangles
fixed temperature detection devices	variable spray nozzles
gloves	water supply source
goggles	
flow charts	
flow meter	
heat lamp	
hoses	
hydrometer	
manometer	
manuals	
masks	
Pitot tubes	
play pipes	
pressure gauge kit	
RPM reader	

